

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The general meteorological conditions which prevailed over the United States during November, 1883, as compiled from the reports from the Signal Service and voluntary observers, and from the monthly reports of state weather services, are shown in this REVIEW.

The month has been marked by a succession of severe storms, which resulted in great damage to shipping interests, especially on the lakes.

The paths of nine atmospheric depressions, which are described under "areas of low barometer," are shown on chart i. During the passage of the depression charted as number vi., severe local storms occurred in the Ohio and Mississippi valleys.

On the afternoon of the 5th a tornado visited Springfield, Missouri, causing considerable loss of life and the destruction of much property.

The mean temperature of the month averaged above the normal over the whole country, except in the middle Pacific coast region, where it was lower than the average. Over the middle slope and northern plateau the departures above the normal temperature exceeded 7° .

Large deficiencies in the monthly precipitation occurred in the districts on the Atlantic and Pacific coasts, while in the Gulf states, Ohio valley, upper lake region, and northern Rocky mountain districts, the precipitation exceeded the November average.

A peculiar appearance of the sky after sunset and before sunrise has been generally observed throughout the United States at intervals during the month.

Under the heading "north Atlantic storms" are described thirteen storms which occurred over the north Atlantic ocean during November, the paths of which are approximately shown on chart ii.

In the preparation of this REVIEW the following data, received up to December 20th, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and sixteen Canadian stations, as telegraphed to this office; one hundred and sixty-two monthly journals, and one hundred and forty-one monthly means from the former, and sixteen monthly means from the latter; two hundred and sixty-three monthly registers from voluntary observers; fifty-two monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Indiana, Iowa, Kansas, Nebraska, Ohio, and Tennessee, and

of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for November, 1883, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart iii. Two areas of barometric maxima are shown on the chart named. One of these covers a region extending from northwestern Texas to Utah, and is inclosed by the isobar of 30.2, the highest barometric mean, 30.28, being reported from Salt Lake City, Utah; while the other (also inclosed by the isobar of 30.2) extends from the Mississippi river to the Atlantic coast, between the thirty-second and thirty-seventh parallels of latitude. Over a small area, including northern Georgia, western South Carolina, and southeastern Tennessee, the monthly mean pressures have been 30.25. To the northward of the regions of greatest pressure, the barometric means decrease to 29.99 at stations in the extreme northwest and lake region, and to 29.95, at Father Point, Quebec; to the southward they decrease to 30.04 at San Diego, California, and to 30.05 at Key West, Florida.

Compared with the mean pressure of the preceding month (October), there has been a decrease, varying from .01 to .14, in the northern districts from Minnesota eastward to New England. In all other sections of the country the mean pressure has been greater than in the preceding month. The greatest increase is shown in Arizona, Colorado, and Utah, where, at some stations, it exceeded .25. On the middle Pacific coast and over the southern districts from New Mexico to the south Atlantic coast, the increase varied from .10 to .20. In the other districts, where an increase has taken place, it has been less than .10.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

The mean pressure for November, 1883, has been below the normal for the corresponding month in all parts of the United States, except at a few stations in the south Atlantic and eastern Gulf states where it has been from .01 to 0.3 above. The greatest departures below the normal have occurred from the upper lake region westward to Idaho, where they ranged from .12 to .16. In New England, the lake region, upper Mississippi and Missouri valleys the departures varied from .05 to .08, and in the other districts they were less marked.

BAROMETRIC RANGES.

The barometric ranges for November, 1883, were greatest in New England, the lake region, extreme northwest, upper Mississippi and Missouri valleys. They were least in California, Florida, and in the eastern Gulf states. Over the entire country the extreme ranges were: smallest, .27 at San Diego, California, and .29 at Key West, Florida; largest, 1.59 at Eastport, Maine, and 1.61 on the summit of Mount Washington, New Hampshire.

In the several districts the monthly barometric ranges varied as follows:

New England.—From .92 at New Haven, Connecticut, to 1.61 on the summit of Mount Washington, New Hampshire.

Middle Atlantic states.—From .75 at Lynchburg, Virginia, to 1.00 at Delaware Breakwater, Delaware.

South Atlantic states.—From .48 at Jacksonville, Florida, to .71 at Kittyhawk, North Carolina.

Florida peninsula.—From .29 at Key West to .40 at Cedar Keys.

Eastern Gulf.—From .57 at Pensacola, Florida, to .85 at Vicksburg, Mississippi.

Western Gulf.—From .80 at Galveston, Texas, to 1.08 at Little Rock, Arkansas.

Rio Grande valley.—From .64 at Brownsville, Texas, to .86 at Rio Grande City, Texas.

Tennessee.—From .72 at Chattanooga, to .99 at Memphis.

Ohio valley.—From .91 at Pittsburg, Pennsylvania, to 1.04 at Indianapolis, Indiana.

Lower lakes.—From .92 at Buffalo, New York, to 1.13 at Oswego, New York.

Upper lakes.—From 1.04 at Milwaukee, Wisconsin, to 1.32 at Duluth, Minnesota.

Extreme northwest.—From 1.10 at Fort Buford, Dakota, to 1.26 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From 1.10 at Cairo, Illinois, to 1.24 at Saint Paul, Minnesota.

Missouri valley.—From 1.10 at Huron and Yankton, Dakota, to 1.27 at Leavenworth, Kansas.

Northern slope.—From .82 at Cheyenne, Wyoming, to 1.15 at Fort Assiniboine, Montana.

Middle slope.—From .81 on the summit of Pike's Peak, Colorado, to .98 at Fort Elliot, Texas.

Southern slope.—From .58 at Fort Concho, Texas, to .77 at Fort Stockton, Texas.

Southern plateau.—From .50 at Forts Apache and Grant, Arizona, to .75 at El Paso, Texas.

Middle plateau.—1.04 at Salt Lake City, Utah.

Northern plateau.—From .99 at Dayton, Washington Territory, to 1.03 at Spokane Falls, Washington Territory.

North Pacific coast.—From .85 at Roseburg, Oregon, to .99 at Olympia, Washington Territory.

Middle Pacific coast.—From .39 at San Francisco, California, to .58 at Red Bluff, California.

South Pacific coast.—From .27 at San Diego, California, to .31 at Los Angeles, California.

AREAS OF HIGH BAROMETER.

Eight areas have been traced during the month. As a rule they have been quite extensive and moved with considerable rapidity. A majority have moved in a more southerly direction than usual. Numbers iii. and iv. were dissipated after reaching Kansas and the Indian Territory. Number vii. was dissipated after reaching southern Illinois. The minimum temperature for the month occurred in nearly all districts during the passage of number iv.

I.—This area is the same as described in the REVIEW for October as number v. On the morning of the 1st it embraced all districts east of the Missouri valley. At this report the centre of area was over the southern portion of the Missouri valley. On the 2d it was central over the lower Mississippi valley. The morning report of the 3d showed the pressure to be greatest over Georgia, and on the 4th the area passed into the Atlantic. The direction of movement was southeasterly. Killing frosts occurred in Indian Territory, Tennessee, Kentucky, Alabama, Georgia, North and South Carolina, during its passage, and brisk to high winds prevailed on the lakes and Atlantic coast.

II.—This area made its appearance on the north Pacific coast on the morning of the 4th. On the 5th it extended over nearly all territory west of the Missouri river. The morning report of the 6th showed it to be central over Kansas and the Indian Territory. After this report it changed its previous southeasterly movement to a northeasterly direction, and, on the 7th, the centre of area was over Ohio and the lower lake region. Passing over the middle Atlantic states the area disappeared on the 8th.

III.—The pressure increased rapidly, during the evening of the 10th, over the territory north of Montana, and the morning report of the 11th showed that the area had moved in a southerly direction and was central in western Dakota. It continued its southerly movement during the 11th, and on the morning of the 12th its centre was over Kansas and the Indian Territory. During the 12th the pressure rapidly diminished and became obliterated. The first frost of the season reported from Louisiana occurred in the northern portion of that state during the passage of this area.

IV.—The reports from the Saskatchewan valley at the midnight report of the 12th showed the presence of an area of high pressure over that region. On the morning of the 13th the pressure had greatly increased over Dakota and Montana, the greatest change being .63 of an inch. The area moved in a direction a little east of south, and on the 14th it was central over Kansas and the Indian Territory. This area was almost identical in its movement and extent with high area number iii., and, like it, after reaching Kansas, the pressure rapidly diminished and the area dissipated.

V.—This area made its appearance on the 14th north of Dakota, moving southeastwardly. On the morning of the 15th it was central over Dakota, where the barometer stood .49 of an inch above the normal. The morning report of the 16th showed the pressure to be greatest over the Mississippi valley. After the 16th the area moved in a more easterly direction, and disappeared into the Atlantic off the Virginia coast on the 17th. The lowest temperatures observed during the month occurred in the various districts east of the Rocky mountains during the passage of this area.

VI.—This area appeared on the 23d in the extreme northwest, moving easterly. On the morning of the 24th it was central over Manitoba. The morning report of the 25th showed the area to have continued its easterly movement, and was central over the Saint Lawrence valley. On the 26th the pressure was greatest over the Gulf of Saint Lawrence, and on that date the area passed beyond the limits of observation.

VII.—The afternoon report of the 25th showed the presence of this area on the California coast. By the morning of the 26th it had moved in a direction a little east of south, and was central over Kansas and the Indian Territory. From thence it pursued a more easterly direction, and on the morning of the 27th the centre of area was over southern Illinois, where the pressure was .40 of an inch above the normal. After this report the pressure slowly diminished, and the area became obliterated on the 28th.

VIII.—On the 27th this area was central in the Saskatchewan valley, moving southeasterly. On the 28th the greatest pressure was over northern Dakota, the barometer standing .50 of an inch above the normal. During the 28th the pressure diminished rapidly as the area moved southeasterly to the middle Atlantic coast, where it was central on the 29th. On the last named date it passed into the Atlantic, greatly diminished in extent and pressure.

AREAS OF LOW BAROMETER.

The following table shows the latitudes and longitudes in which each depression was first and last observed, and the average hourly velocity of each depression within the limits of observation:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	33 00	102 00	49 00	59 00	30.6
II.	40 00	96 00	47 30	59 00	47.5
III.	45 00	97 00	50 00	60 00	49.5
IV.	50 00	91 00	47 30	60 00	37.4
V.	39 45	57 30	48 45	88 00	34.4
VI.	34 15	95 45	50 15	69 00	55.0
VII.	44 45	100 00	48 45	85 30	31.2
VIII.	47 00	103 30	51 30	69 00	35.7
IX.	49 45	109 00	46 15	64 00	45.3

Mean hourly velocity, 39.4 miles.

Nine areas have been charted during the month. Most of these proved to be very violent storms on the lakes and Atlantic coast. With the exception of numbers i., iv., and ix., they have developed within the limits of the chart. Number iii. was the severest storm occurring during November, both on the lakes and the Atlantic coast. Number viii. was especially severe on the lower lakes.

I.—This area first made its appearance in the Saskatchewan valley on the morning of the 4th. During that day the cloudiness increased in the upper lake region, Mississippi and Missouri valleys with light local rains in those districts. On the morning of the 5th the centre was north of Minnesota, and general rains reported from the districts previously mentioned. The winds on the lakes had increased considerably in force. At midnight of the 5th the depression was central over eastern Michigan, having, up to this report, pursued a southeasterly direction. The rain area embraced Tennessee and the Ohio valley, lake region and Mississippi valley. After this report the disturbance changed its course to a northeasterly direction, moving with greater rapidity, accompanied by high winds on the lower lakes, and at the morning report of the 6th it was central east of the Georgian bay. On the 7th the centre was over the Gulf of Saint Lawrence, and the area passed beyond the limits of the chart on that date. Light rains fell in the middle, south Atlantic, and New England states, and high westerly winds prevailed on the Atlantic coast. The lowest barometer reading observed was 29.50 at Saugeen, Canada, on the 6th.

II.—This area developed in Kansas during the afternoon of the 8th. At that report the barometer had fallen considerably, the pressure being .52 of an inch below the normal at Leavenworth, Kansas, where light rain had fallen. Moving in a northeasterly direction, accompanied by rain, this depression was central on the morning of the 9th over eastern Michigan. During the 9th it increased somewhat in energy, the winds on the lower lakes blowing strongly from the west. Passing over the St. Lawrence valley and northern Maine, the area was central on the 10th over the Gulf of St. Lawrence, on which date it passed beyond observation. Rain fell in all districts north of the Gulf and south Atlantic states. The lowest barometer observed was 29.39 inches at Toronto, Canada, on the 9th.

III.—This storm proved to be the most violent of the month. Light snow began to fall during the evening of the 10th, in the extreme northwest, and the barometer in that district fell slowly. At the 11 p. m. report of the 10th, the pressure at Moorhead, Minnesota, was .43 of an inch below the normal. After its development, the area increased in energy as it advanced eastward. The morning report of the 11th showed the centre of disturbance was over Lake Superior. The winds on the upper lakes increased in force, and during the day reached a velocity of over fifty miles an hour on Lake Michigan, and, by the evening, became quite violent on the lower lakes—from twenty-six to fifty-five miles per hour. On the 12th the area was central over the lower Saint Lawrence valley, and on that date passed beyond limits of the chart. Westerly gales prevailed on the Atlantic coast during its passage, and were especially severe on the New Jersey coast where the wind reached a velocity as high as sixty-eight miles. Rain and snow fell in all of the northern districts. The movement of translation was very rapid. The lowest barometer observed was 28.42 inches at Anticosti Island, Gulf of Saint Lawrence, on the 12th.

IV.—This weak depression was first observed during the evening of the 12th north of Minnesota. On the morning of the 13th it was central north of Lake Superior. On the 14th it was central over the lower Saint Lawrence valley. Light snow had fallen in the lake region and rain in the middle Atlantic and New England states. After this report it altered its previous southeasterly course to a direction a little north of east, and on the 15th disappeared, passing over Newfoundland.

V.—This area developed in western Kansas during the after-

noon of the 19th. On the 20th it had moved in a northeasterly direction and was central over western Michigan, and during the afternoon passed into British America, north of Lake Superior. This storm had but little energy, but the area of precipitation extended over all districts.

VI.—The barometer, at the morning report of the 21st, showed a marked fall in the western portion of the Indian Territory. During the day the pressure diminished rapidly, and the area, accompanied by rain, moved in a northeasterly direction to eastern Michigan, where it was central at midnight of the 21st. As it approached the lake region, the winds, especially on the lower lakes, increased in force and blew with great violence, reaching a velocity of from forty to forty-eight miles an hour. On the morning of the 22d the disturbance was central north of Rockcliffe, Canada, and continuing its northeasterly course the area passed beyond the limits of observation during the afternoon of the 22d. The lowest barometer observed was 29.28 inches, at Rockcliffe on the 22d.

VII.—The midnight report of the 22d showed that the barometer had fallen slightly in the previous eight hours in the Missouri valley, the pressure at Huron, Dakota, being .44 of an inch below the normal. The depression had but little energy. It advanced in the first eight hours after its development in a direction nearly east, but after reaching the upper Mississippi valley, on the afternoon of the 23d, it altered its course and moved more to the northeast, passing over Lake Superior, and disappearing into British America on the 24th. Light rains fell in the northern districts and light winds prevailed on the lakes during its passage.

VIII.—This depression developed during the evening of the 24th in northern Dakota. The pressure at Bismarek at the midnight report being .60 of an inch below the normal, with a fall in the barometer of .34 of an inch in eight hours. The storm first advanced northeasterly to Manitoba, where it was central on the morning of the 25th. Easterly winds had prevailed in the upper lakes, increasing in force as the disturbance approached that region. The afternoon report of the 25th showed the centre to be over southern Minnesota, the storm having moved in nearly a south-southeasterly direction from Manitoba. At this hour general rains were falling in nearly all districts. The winds on the upper lakes became quite violent, shifting to a westerly direction and blowing with renewed force, owing to the rapid increase in pressure in rear of the storm. The winds on the lower lakes, though not as high as those on the upper lakes, were, however, very dangerous. On the morning of the 26th the centre of disturbance was over the northern portion of lake Michigan, having moved northeasterly from southern Minnesota. The area moved very rapidly after this report and, on the morning of the 27th, was some distance north of the lower Saint Lawrence valley, disappearing on that date. Severe gales occurred on the Atlantic coast during the passage of this depression. The lowest barometer observed was 29.41 at Saint Vincent, Minnesota, on the 25th.

IX.—This depression made its appearance north of Montana at midnight of the 28th. On the morning of the 29th it was central over Dakota. The area moved with great rapidity and, after the morning report of the 29th, increased considerably in energy as it approached the Atlantic, causing high winds on the New England coast. The morning report of the 30th showed the depression to be central over the Saint Lawrence valley, and after midnight of that date it passed into the Atlantic off Nova Scotia. Light rains fell during its passage in the northern districts.

NORTH ATLANTIC STORMS DURING NOVEMBER, 1883.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during November, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing

vessels in the north Atlantic, and from other miscellaneous data received at this office up to December 24th. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. p. m., Greenwich, mean time.

The month of November, 1883, was marked by a succession of strong gales over the north Atlantic, no fewer than thirteen depressions having been sufficiently well defined within the limits of observation to admit of an approximation of their paths. In most of the disturbances shown on the chart the atmospheric depression was very deep; they were closely followed by a rapid increase of pressure in the western quadrants, causing steep gradients for westerly and northwesterly winds, and, as a fact, the hardest gales were from southwest through west to northwest and north. Many vessels arriving at British and at American ports during the last decade of the month showed evidence of the stormy character of the weather, having lost boats, had decks swept, or were otherwise damaged. The storms charted as numbers viii. and ix., which apparently united during the 17th, were the most severe of the month; during the passage of these disturbances the barometer fell below 29.00 (736.6).

The following descriptions refer to the depressions charted:

I.—This was a continuation of a disturbance charted as number vii. on chart ii. for October. At the close of that month the centre of disturbance was near N. 51°, W. 45°. Moving slowly northeastward, the region of least pressure was transferred to about N. 56°, W. 35°, on the 1st, on which date the s. s. "Sardinian," in N. 56° 35', W. 35° 58', reported barometer 29.2 (741.7), wind sw. by s., force 6, cloudy. Vessels to the southward had moderate to strong w. and sw. gales. The s. s. "State of Indiana," in N. 51° 12', W. 37° 14', reported barometer 29.6 (751.8), wind w., force 9, squally; vessels to the northeastward of the "State of Indiana," had ssw. winds of force 6. During the day the storm-centre moved northeastward, and on the 2d it passed beyond the field of observation. The s. s. "Lake Manitoba," in N. 56° 29', W. 20° 10', on the 2d, reported barometer 29.59 (751.6), wind wnw., force 6.

II.—During the 1st an area of low barometer moved over the Canadian Maritime Provinces, and by the 2d the shifting of the wind and the decrease of pressure, reported by vessels west of the fortieth meridian, indicated that the disturbance had passed to the eastward of Newfoundland. Moderate to strong s. and sw. gales prevailed over the region between W. 50° and 40°, and N. 45° and 52°, the lowest reported barometric readings being 29.8 (756.9); whilst an area of moderately high pressures occupied the ocean to the eastward of W. 40° and south of N. 52°. The s. s. "Scandinavian," in N. 52° 08', W. 35° 53', reported on the 2d, 10 a. m., wind light and backing to south, barometer 30.1 (764.5), falling gradually; 5.30 p. m., heavy rain, wind hauling to sw. The disturbance moved northeastward, and on the 3d the region of least pressure was shown to the northward of the fifty-fifth parallel and between W. 25° and 30°. To the westward of the thirty-fifth meridian the winds had shifted to n. and w., attended by a slight increase of pressure, whilst a corresponding decrease of pressure occurred over the region occupied by the high area above referred to. By the morning of the 4th the disturbance was central off the northern coast of Scotland, the pressure having decreased to 29.33 (745.0), and the wind having attained the force of a whole gale. Captain Andersen, of the ship "Festina Lente," anchored on the "Tail of the Bank," Greenock, reported as follows: "November 3d, in the evening it began to blow a gale from the southwest, with heavy rain, and on the morning of the 4th the wind flew round to northwest, blowing a heavy gale, with tremendous squalls of wind, accompanied by rain and hail."

III.—This disturbance probably originated south of Newfoundland on the 3d; on that date the s. s. "Gallia," in N. 44° 04', W. 53° 13', reported barometer 29.96 (761.0), variable winds, mostly easterly, hard squalls and constant rain. During the 3d the depression moved northeastward, and, on the

4th, it was central near N. 48°, W. 43°. The s. s. "Fulda," in N. 48° 08', W. 40° 32', reported barometer 29.73 (755.1), a fall of about .25 inch, wind sse., force 5, heavy rain. The s. s. "State of Georgia," in N. 48° 44', W. 47° 26' reported barometer 29.8 (756.9), wind nne., force 7, weather dark and rainy. Captain Weiss, of the s. s. "Llandaff City," between N. 45° 00', W. 43° 14' and N. 46° 37', W. 38° 04', reported as follows: "November 3d, 13 h. 40 m. (Greenwich mean time), barometer, 30.14 (765.5); the wind, which, during the previous twelve hours, had hauled right round the compass, with almost constant rain, freshened rapidly from wsw., and, at 14 h. 40 m., was at force 7; it blew with that force until 7 h. 24 m. (Greenwich mean time), of the 4th, when it increased to force 9, the barometer having gone down to 29.84 (757.9)." Moving east-northeastward with decreasing pressure, the centre of disturbance was shown near N. 52°, W. 17°, on the 5th. On that date the s. s. "Germanic," in N. 50° 56', W. 25° 56', reported barometer 29.13 (739.9), wind wnw., force 7; the s. s. "Arizona," in N. 50° 14', W. 17° 10', barometer 29.19 (741.4), wind wsw., force 7, overcast and raining; and the s. s. "British Crown," in N. 52° 03' W. 19° 27', barometer 29.18 (741.2), wind w. by s., force 4. Vessels in the southeast quadrant of this depression reported moderate to fresh southwesterly and westerly gales, with high, confused sea. During the 5th and 6th the disturbance passed eastward over the British Isles.

IV.—This was a depression which moved eastward over the ocean north of the fifty-fifth parallel. Few reports have been received from that region, but observations taken on board the steamships "Lake Huron" and "Buenos Ayrean," indicate the existence of an extensive area of low pressure (below 29.5) which gave moderate to strong westerly gales, especially on the 9th, when the s. s. "Lake Huron," in N. 56° 00', W. 12° 35', reported barometer 29.52 (749.8), wind wnw., force 7, with heavy squalls of hail and snow, and very high sea.

V.—This was probably a continuation of the depression charted as low area i., chart i., of this REVIEW. During the 7th the disturbance passed over the Canadian Maritime Provinces into the Atlantic, and on the following day it was central near N. 44°, W. 60°, the pressure having decreased about .35 inch over that region during the twenty-four hours. The s. s. "General Werder," in N. 43° 54', W. 58° 44', reported barometer 29.55 (750.6), (being a fall of .48 inch since the observation of the 7th), wind se., force 2 to 3, weather cloudy; and the s. s. "Iowa," in N. 42° 20', W. 66° 57', barometer 29.81 (757.2), rising, wind nnw., force 6, overcast. Vessels between W. 55° and 50°, reported pressure ranging from 29.6 (751.8) to 29.8 (756.9), with moderate to fresh se. winds. By the morning of the 9th, the disturbance, having moved in a northeasterly course, was central near N. 48°, W. 50°, in which region the pressure ranged from 29.27 (743.7) to 29.5 (749.3). The s. s. "Lord Gough," in N. 48° 4', W. 48° 47', on the 9th, reported barometer 29.27 (743.4), wind s. by w., force 5; at 6 p. m. (Greenwich mean time), sudden shift of wind to wnw., force 5, barometer 29.19 (741.4); and the s. s. "Arizona," in N. 45° 54' W. 50° 39', barometer 29.31 (744.5), wind sw., force 5. The pressure had increased to the southwestward, and, as the gradient became steeper, the northwesterly winds increased in force. By the morning of the 10th the area of least pressure was transferred to about N. 52°, W. 33°. The s. s. "Greece," in N. 48° 56', W. 30° 53', reported barometer 29.49 (749.0), wind sw., force 5, rain. Captain Pearce also reports: "during this twenty-four hours the wind backed from w. to sse., hauled again to the west and backed again to sw.; at 7 a. m., fog set in which continued until 10 a. m., when the wind hauled to the westward and blew with increased force." The s. s. "Nova Scotian," in N. 50° 38', W. 36° 4', also reported barometer 29.41 (747.0), wind w. by n., force 5, showery. Vessels near the fiftieth parallel and from W. 30° eastward to W. 20°, reported southwesterly and south-southwesterly winds of force 5 to 6, with rain. On the 11th the pressure was least near N. 55°, W. 19°; on that date the s. s. "British Princess," in N. 54° 20', W. 26° 20', reported barometer 29.16 (740.7),

wind wnw., force 7, overcast. Strong westerly gales were reported by vessels on the fiftieth parallel, and between W. 30° and 18°. On the 12th the depression was over the British Isles, where the pressure ranged from 29.7 (754.4) to 29.8 (756.9).

VI.—This was a continuation of a somewhat deep depression which passed over the Maritime Provinces on the morning of the 10th, when the observed pressure was below 29.4 (746.7). During the 10th the south and south-southwest winds which prevailed over the region east of the centre (between W. 60° and 50°) did not attain a greater force than that of 5 to 6 (fresh to strong breeze), owing, probably, to the fact that, as the pressure increased very slowly after the passage of low area v., the barometric gradient to the eastward was of moderate inclination. On the 11th the centre of depression was near N. 50°, W. 41°, the lowest reported barometric readings ranging from 29.43 (747.5) to 29.52 (749.8). As the pressure began to increase in the region west of the centre, the westerly and northwesterly winds increased in force, but the southerly winds in the eastern quadrants remained moderate in force. On the 12th a great decrease of pressure appears to have occurred, the region of low barometer extending from W. 40° eastward to W. 20°; within this extensive area the lowest readings were as follows: s. s. "British Crown," in N. 53° 26', W. 30° 00', barometer 28.82 (732.0), wind wsw., force 2; s. s. "Denmark," in N. 49° 00', W. 32° 50', barometer 28.93 (734.8), wind wsw., force 5, cloudy and threatening; s. s. "Habsburg," in N. 49° 07', W. 32° 48', barometer 28.93 (734.8), wind sw., force 6, fair; s. s. "Elbe," in N. 49° 24', W. 30° 00', barometer 29.00 (736.6), wind wsw., force 6-7, overcast, squally; s. s. "Greece," in N. 47° 40', W. 38° 49', barometer 29.18 (741.2), wind n., force 8; s. s. "Lord Gough," in N. 51° 00', W. 26° 04', barometer 29.07 (738.4), wind s. by e., force 7, raining. Moderate southerly gales were experienced by vessels between N. 48° and 52°, and from W. 27° eastward to W. 15°, while moderate to strong northerly and westerly gales, with hurricane-like squalls, prevailed in the western quadrants. During the 12th the disturbance appears to have moved by a course slightly south of east, the direction of the wind on the 13th indicating that the depression was near N. 51°, W. 17°. The pressure had increased to 29.5 (749.3), and the winds between W. 30° and 10° had decreased in force; to the westward of the thirtieth meridian, however, the wind changed from west to south and blew with the force of a moderate to strong gale in advance of a deep depression then moving northeastward from the Gulf of Saint Lawrence. During the 13th the depression apparently filled up, the reports of the following day showing a considerable increase of pressure over the British Isles and the ocean westward to W. 18°.

VII.—This is a continuation of the track of low-area iii., chart i. It passed as a severe storm over the Maritime Provinces during the 12th, the lowest observed barometer at land stations being 28.8 (731.5). During its passage over the Gulf of Saint Lawrence it caused strong southeasterly to southwesterly gales, which, on the 13th, changed to northerly and northwesterly, and continued to blow with great force. Captain James Scott, of the s. s. "Buenos Ayrean," reported as follows: "12th, off Cape Chatte, Gulf of Saint Lawrence, noon, strong and increasing breeze from w. by s., with heavy snow; 8.30 p. m., wind freshened from same direction to gale with heavy snow, heavy sea getting up; 10.30 p. m., strong gale from w. by s., with blinding snow squalls and very heavy sea running; 12.30 a. m., gale moderating a little and snow squalls taking off." Strong northwesterly gales also occurred off the coasts of the New England and middle Atlantic states, causing much damage to coasting vessels. On the 13th the pressure was least near the Straits of Belle Isle, the s. s. "Oregon," in N. 52° 27', W. 53° 00', reporting barometer 28.41 (721.6), wind w., force 6, cloudy. Captain Williams reported as follows: "13th, midnight, snow and hailstorm from sse. At 3 a. m., same date, the wind shifted to the westward, lowest reading of the barometer at 2 a. m., 28.4 (721.3), electric light on all the masts and yards; noon, barometer 28.46 (722.9).

Vessels between W. 50° and 40° and N. 45° and 52° reported pressures ranging from 28.9 (734.0) to 29.1 (739.1), with very heavy southerly gales, furious squalls and high sea. Those to the southward of N. 45° encountered very heavy westerly and southwesterly gales, the s. s. "Lydian Monarch," in N. 44° 40', W. 56° 08', reporting a hard wsw. gale, in which she carried away the starboard rail and lost a life-boat. The brig "Rise and Shine," in N. 44°, W. 52°, had decks swept and lost sails. S. s. "Greece," W. Pearce commanding, in N. 46° 53', W. 43° 29', reported as follows: "13th, 1.30 a. m., wind backed to the sw.; 6.00 a. m., barometer 29.59 (751.6), wind se., increasing in force to heavy gale, passing showers of thick rain; 8.00 a. m., barometer 29.04 (737.6), wind se., strong gale, and passing showers of thick rain; 10.00 a. m., wind hauling to s. and decreasing in force, barometer 29.02 (737.1); 11.00 a. m., wind came suddenly from nw., heavy squalls, with hail."

The following reports indicate the severity of the storm during the 12th and 13th: s. s. "Hohenstaufen," Th. Yungst commanding, 12th, in about N. 43° 04', W. 58° 33' from noon to 10.00 p. m. the barometer fell from 29.63 (752.6) to 29.14 (740.1), strong gale with heavy rain and hail squalls, wind shifting from s. to sw., and afterwards to wnw., with a force of 9 to 10, high, irregular sea from w. and wnw; 13th, 6 a. m., barometer 29.11 (739.4), very heavy storm from nw., force 10, with heavy rain and hail. S. s. "Bothnia," H. McKay commanding, in N. 42° 20', W. 59° 00', to N. 41° 40', W. 62° 23', reported as follows: "12th, noon, continuous rain, wind se., force 6, barometer 29.7 (754.4); 4 p. m., wind s. 42 w., force 6, barometer 29.26 (743.2); 8 p. m., wind n. 87 w., force 6, barometer 29.21 (741.9); midnight, wind n. 87 w., force 8, barometer 29.26 (743.2); 13th, 4 a. m., wind n. 87 w., force 9, barometer 29.26 (743.2), fierce squalls with high head sea; 8 a. m., wind n. 87 w., force 10, barometer 29.19 (741.4), heavy gale, with terrific squalls of hurricane force attended by hail and snow, high, mountainous sea." S. s. "Lord Clive," P. Urquhart commanding: "12th, noon, ship's time, N. 44° 46', W. 55° 30', barometer 29.73 (755.1), fresh sse. wind; 4 p. m., N. 44° 23', W. 56° 16', barometer 29.34 (745.2), ssw. gale with rain 8 p. m., barometer 29.27 (743.4), sw. gale; midnight, barometer 29.27 (743.4), wind sw., blowing a hurricane with terrific hail, rain, and snow squalls, sea high; 4 a. m., barometer 29.25 (742.9), weather the same, sea very high; 8 a. m., barometer 29.25 (742.9), weather the same; 13th, noon, N. 43° 15' W. 57° 55', barometer 29.40 (746.7), wind and squalls the same; 1 p. m., beginning to moderate, and continuing to do so until noon of the 14th, barometer 30.1 (764.5), wind back to sw., moderate, sea going down." S. s. "Rugia," A. Albers commanding: "13th, 4 p. m. (Greenwich time), N. 42° 40', W. 58° 00', wind increasing from sse. with rain; 8 p. m., barometer 29.27 (743.4), wind w., increasing to a violent gale, furious hail squalls, sea running very high and irregular and breaking from sw., w., and wnw; on the 14th, 8 p. m., storm decreasing, but still a high and breaking sea from sw. by w.; ship's position at 4 p. m. of the 14th, N. 41° 16', W. 60° 09'."

The reports of the 14th indicate that the disturbance moved north-northeastward beyond the fifty-fifth parallel. A slight increase of pressure occurred over the region south of 50° north latitude, and the westerly winds increased to almost hurricane force. This depression apparently moved beyond the field of observation before reaching the fortieth meridian.

VIII.—The marine reports at hand indicate that this disturbance and that charted as ix., which apparently united with it, were the most severe storms of the month; and that they far exceeded in violence the usual November gales. Number viii. was probably a continuation of low area iv., of chart i.; passing over the Maritime Provinces and the Gulf of Saint Lawrence as a shallow depression on the 14th, the centre of disturbance reached N. 52°, W. 45°, on the 15th. On that date the s. s. "British Prince," in N. 50° 20', W. 42° 40', reported barometer 29.63 (752.6), wind ssw., force 8. To the southward and westward, the pressure ranged from 29.8 (756.9)

to 30.1 (764.5), and moderate to strong southerly gales were reported by vessels between W. 50° and 40°. On the 16th the centre of disturbance was not well-defined, owing to the absence of reports from the region north of 55°, north latitude, but was probably near N. 55°, W. 40°. South of N. 50°, and between W. 40° and 30°, the barometric readings were high, and moderate westerly and northwesterly gales prevailed, while between W. 30° and 20° strong southwesterly winds were reported. S. s. "Oregon," H. C. Williams commanding, in N. 56° 34', W. 30° 45', reports as follows: "16th, 1 a. m., lowest reading of the barometer 29.00 (736.6), winds continually oscillating from w. to sw., wind and sea furious." On the 17th the storm-centre was near N. 54°, W. 34°, the s. s. "Polaria," in N. 53° 58', W. 34° 40', reported having experienced a hurricane on the 17th; the wind subsided to nearly a calm, but in a short time it came out from wnw. with terrific force, the sea being in a perfect foam; soon after this the barometer began to rise, but the sea rose to a fearful height, completely washing over the vessel. On the 18th the region of least pressure was near N. 56°, W. 18°, where this depression became merged in low area ix., displaying all the violence which characterized the latter depression during its earlier movements; the course of number viii. after the 17th, is hereafter described in connection with depression number ix.

IX.—During the night of the 15-16th a slight depression passed east-southeastward over southern Quebec and northern Maine, and by the morning of the 16th it was central south of Nova Scotia, the lowest reported barometer being 29.77 (756.1). The winds shifted to east and southeast over the region from W. 65° eastward to W. 50° and blew with the force of a strong gale; as the pressure rapidly increased in rear of the depression, very strong northwesterly gales occurred along the coasts of the United States as far south as N. 33°. The disturbance moved rapidly northeastward, attended by decreasing pressure, the barometric readings on the 17th being below 29.0 (736.6) near N. 45°, W. 43°. Steep gradients were formed in rear of the depression, and the northerly and northwesterly winds attained hurricane force. The following extracts serve to indicate the extreme violence of this storm: Captain Buschmann, of the s. s. "Zeeland," in about N. 47° 10', W. 42° 05', reported: "November 17th begins with strong, unsteady se. wind and rising sea, barometer 29.6 (751.8); 7 a. m. (Greenwich mean time), wind and sea increasing and barometer falling to 29.4 (746.7); 9 a. m., strong gale, wind hauling to southwest, barometer falling to 29.2 (741.7); 11 a. m., strong, increasing gale and high sea, wind veering to wsw., barometer 29.12 (739.6). From noon to 2 p. m., hurricane from wsw. to wnw., sea running very high, ship hove to, with cloth in the mizen rigging, barometer 28.9 (734.0); 3 p. m., wind nw., heavy gale and high, confused sea, sky breaking up and barometer rising to 29.14 (740.1); 6 p. m., wind and sea decreasing, barometer 29.6 (751.8)." Captain Frangeul, of the French s. s. "Canada," reported 17th: "From 8 a. m. to 2 p. m. a terrific sw. gale, with squalls from ssw. at 3 o'clock, and a sudden and rapid fall of the barometer of about .28 inch per hour, for two and a half hours. In N. 48° 18', W. 40° 57', the barometer read 29.03 (737.3), wind sw., force 8, cloudy." Captain Myer, of the bark "Heinrich and Tonio," reported on the 16th and 17th, in N. 41° 21', W. 64° 30', wind se., thick, rainy weather until 10 a. m.; wind then moderated and hauled to nw., with clearing weather; it afterwards blew a heavy nw. gale, with snow and hail-squalls, lasting fourteen hours.

Captain Park, of the s. s. "Scandinavian," in N. 44° 11', W. 56° 40', reported: "16th, wind increasing to a gale from the eastward, with high sea; 4 p. m., fresh e. gale and cloudy; 9 p. m., wind veered suddenly to ssw., and gradually to w., lowest barometer 29.19 (741.4); 17th, 3 a. m., wind flew suddenly into nw., with lightning and squalls, and increased to a heavy gale, with high, dangerous sea; rounded the ship to; 11 a. m., gale moderating, kept off to course; remainder moderate, with snow-squalls and heavy cross sea, barometer rising."

Captain Watkins, of the s. s. "City of Berlin," forwards the following:

Changes of the wind, barometer, &c., for the 24 hours beginning noon the 16th of November, ending noon the 17th.

Hour.	Barometer.	Wind.		Weather.
		Direction.	Force. (0-12.)	
Noon	30.11	east.	2	Partly cloudy.
2	30.05	east.	2	Do.
4	29.95	east.	4	Overcast.
6	29.79	east.	7	Overcast and rain.
8	29.45	se.	5	Do.
10	29.26	wnw.	5	Do.
12	29.25	wnw.	8	Overcast.
2 a. m.	29.12	wnw.	9	Do.
4	28.95	west.	10	Overcast, with violent squalls.
6	29.33	nnw.	11	Overcast, with violent squalls of hail and sleet.
8	29.72	nw.	10	Do.
10	29.95	nw.	9	Do.
12	30.09	nw.	5	Do.

Lat. noon the 16th, 46° 04', long. 47° 07'; lat. noon 17th, 45° 02', long. 52° 21' W.

Captain Willigerod, of the s. s. "Elbe," furnishes the following:

Local time.	Barometer.		Wind.		Remarks.
	Inches.	Mill.	Direction.	Force. (0-10.)	
November 16.					
Noon	29.91	759.7	se.	6	Ship's position N. 43° 50', W. 56° 46'.
4.00 p. m.	29.30	744.3	se.-e.	8	Ship's position N. 43° 26', W. 58° 5'. Wind fell light for a short time and suddenly shifted to sw. and w.; increasing wind and sea; threatening appearance.
8.00 p. m.	29.35	746.1	sw.	8-9	N. 43° 10', W. 56° 55'; heavy squalls with rain; terrible sea.
9.30 p. m.	29.09	738.8	sw.	10	Wind blew with hurricane force from sw. hauling to nw.; ship laboring heavily and shipping much water; sea surface all foam and spray.
10.00 p. m.	29.15	740.3	nw.	10	Tremendous sea.
10.30 p. m.	29.42	747.3	nnw.	10	Ship covered with foam and spray; unable to see twenty feet ahead.
11.00 p. m.	29.64	752.8	n.	10	Confused sea from all directions; ship laboring fearfully.
11.30 p. m.	29.72	754.8	nnw.	8	Decreasing wind and sea; blowing in squalls with hail and rain.
Midnight			n.	8-7	Moderating.
November 17.					
4.00 a. m.	30.22	767.5	n.	5	High nw. swell.

Captain Hellmers, of the s. s. "Habsburg," reported as under:

Ship's apparent time.	Barometer.		Temperature.		Wind.		Remarks.
	Inches.	Mill.	Fahr.	Cent.	Direction.	Force (0-10)	
17th, 0.00 a. m.							
" 1 "	29.13	739.9	48.2	9.0	wnw-ww	6-8	N. 44° 49', W. 53° 07'.
" 2 "	29.04	737.6	46.4	8.0	s.	7-8	
" 3 "	29.02	737.1	41.9	5.5	s.	5-9	
" 4 "	29.06	738.1	39.2	4.0	wnw by n	9-10	At 2.50 wind flying round from s. (force 8-9) to w. (force 8-9).
" 5 "	29.29	744.0	33.8	1.0	nw. by n.	10	At 3.10 from w., 9, to nw. by n., 10. A very heavy, dangerous sea; ship drifting bodily to leeward.
" 6 "	29.45	748.8	35.6	2.0	nw. by n.	10	
" 7 "	29.86	758.4			nw. by n.	9	
" 8 "	29.96	761.0	32.0	0	nw. by n.	9	
" 9 "	30.08	764.0	31.1	-0.5	nw. by n.	9	
" 10 "	30.09	764.3	32.0	0	nw. by n.	8	
" 11 "	30.10	764.5	33.8	1.0	nw. by n.	8	
Noon	30.22	767.6			nw. by w.	7	Latitude at noon, by observation, N. 44° 39', W. 54° 01'.

Captain McMickan, commanding the s. s. "Gallia," between N. 41° 35', W. 58° 37', and N. 43° 19', W. 50° 40', reported as follows:

	Barometer.		Wind.	Remarks.
	Inches.	Mill.		
16th, noon	29.59	751.6	ene.	Fresh gale; high, confused sea; raining.
" 2 p. m.	29.38	746.2	sw.	1.00; shift of wind to sw., increasing to a gale.
" 4 p. m.	29.40	746.7	wnw.	Strong gale; dark, gloomy weather; high sea.
" 6 p. m.	29.50	749.3	wnw.	Strong gale; hard squalls and rain.
Midnight	29.47	745.5	wnw.	Strong gale; hard squalls and rain.
17th, 2 a. m.	29.47	746.7		Barometer fluctuating.
" 4 a. m.	29.45	748.0		Barometer rising; furious gale; violent squalls; rain and sleet.
" 8 a. m.	29.90	759.4		Wind and sea moderating; squalls less severe.
noon	30.14	765.4		Wind veering to nw.; finer weather; high wnw. sea.

Captain Tyson, of the s. s. "Denmark," reported N. 45° 20', W. 50° 30', "17th, 1 a. m., barometer 28.93 (734.8), wind sw. thence to wsw., force 7; 9.30 a. m., sudden shift to nw., and increased to force 10, with terrific squalls of snow, hail, and sleet, and high sea, lasting six hours." Captain Freeth, of the s. s. "British Prince," in N. 47° 14', W. 50° 50', reported, "17th, 11 a. m., wind shifted from wsw. to ne., and blew a hurricane for five hours, with hail and snow storm; high cross sea running." S. s. "Greece," W. Pearce commanding, between N. 44° 13', W. 53° 53', and N. 42° 35', W. 56° 59', on the 16th and 17th, reported as follows: "17th, p. m., barometer 30.18 (766.6), wind increasing from the e. by n.; 5 p. m., wind hauled to the sw., barometer 29.48 (748.8); midnight, wind increased to a hurricane, barometer 29.18 (741.2); 0.45 a. m., wind hauled to n., and the barometer rose rapidly; 2 a. m., barometer 29.53 (750.0), hurricane continued to abate, and by 8 a. m. the barometer stood at 30.18 (766.6); at 7.30 passed a quantity of wreckage."

Captain McNay, commanding the s. s. "Pavonia," reported as follows: "16th, in N. 46°, W. 40°, 6 p. m., the wind came out in a light breeze, with overcast sky, and dark, inky clouds passing; 8 p. m., the wind veered east, moderate breeze and rainy weather, barometer 29.96 (761.0); 10 p. m., wind s., began to freshen, barometer falling rapidly and the sky assuming a threatening appearance; midnight, strong and rapidly increasing sw. wind, with dark, cloudy sky and rising wsw. sea, heavy squalls and showers of rain. 17th, 4 a. m., hard gale from sw., with squalls of hurricane force, the sea becoming perfectly white with foam; noon, latitude 45° 30' N., longitude 43° 27' W., still a violent gale, with very high sea, dark cloudy sky and fierce squalls, barometer 29.23 (742.4), wind veering to w. by s.; 1 p. m., barometer 29.29 (744.0), beginning to rise rapidly, but still no lull in the gale. The wind, still veering, caused the sea to rise to an extraordinary height, becoming cross and very rough; 2 p. m., wind nnw., moderating somewhat, barometer 30.13 (765.3) and still rising, the sky occasionally clear, squalls of sleet and snow, the temperature falling considerably; 6 p. m., weather still moderating, with less sea, barometer 30.39 (771.9)."

Captain Woolfenden, of the s. s. "Samaria," reported: "17th, 2.55 a. m., barometer 29.22 (742.2), wind ssw., fresh gale and overcast sky, with heavy rain, which continued up to 8.30 p. m.; in N. 44° 15', W. 47° 10', barometer 29.04 (737.6), when the wind veered to w. by s. and increased suddenly to a furious gale, sky heavily overcast, and very heavy sea running; 10.30 a. m., still blowing furiously, barometer 29.12 (739.6), sky clearing in the northwest; noon, gale moderating, barometer 29.24 (742.7), wind veering."

Captain Fitt, of the s. s. "Virginian," in about N. 45° 47', W. 46° 00', reported: wind sw., heavy gale, lowest barometer 29.20 (741.7), then sudden shift from sw. to nw., with very heavy rain, wind force 10.

Most of the above reports show the rapid increase of pressure which occurred after the wind had shifted to the northward, especially the reports of the "Pavonia," "Elbe," and "City of Berlin." Much wreckage was passed by some of the above vessels, and recent cable dispatches (December 27th) seem to indicate that the s. s. "Plantyn" was disabled and abandoned during this gale, that vessel having encountered the hurricane on the 17th in N. 44° 17', W. 42° 20', when boats, deck-houses, &c., were carried away, engine-room flooded, &c.

By the 18th the depression had apparently united with low area viii., the region of least pressure on that day being near N. 57°, W. 18°. To the westward of the thirtieth meridian the pressure continued to increase, the barometer readings ranging from 30.40 (772.1) to 29.9 (759.4), while northerly and northwesterly winds, of hurricane force, still prevailed to the westward of W. 25°. In N. 52°, W. 25°, to W. 12°, the pressure was about 29.8 (756.9), and strong westerly gales were reported.

Captain William, of the s. s. "Oregon," which vessel was between N. 56° 20', W. 22° 53', and N. 55° 57', W. 18° 10',

from the 16th to 17th, reported as follows: "November 18th, 2 a. m., lowest reading of the barometer 28.8 (731.5), wind s. (true), blowing a perfect hurricane, split fore and aft sails; brought the ship head on to the sea; at 4 a. m. the wind shifted to the westward, and from that time until midnight the sea was perfectly frightful. A long mountain of a roll from the w., with a sea from s. rolling the tops of the waves into sugar-loaf heaps and boarding the ship in every direction. At midnight, wore ship and resumed course, carrying a long, heavy swell from the w., with heavy hail squalls all the rest of the passage into the north channel."

The s. s. "British Crown," R. Wills commanding, experienced a furious westerly gale in about N. 52°, W. 19°, carrying away starboard life-boat; the barometer at the simultaneous observation of the 18th read 29.67 (753.6). The s. s. "Devonia," in N. 55° 20', W. 12° 38', on the 18th reported barometer 29.42 (747.3), wind w., force 8, heavy squalls, with hail and rain; and the s. s. "State of Indiana," in N. 55° 22', W. 9° 00', barometer 29.3 (744.2), wind w., force 7. The s. s. "Minerva," in N. 50°, W. 22°, during the 17th and 18th encountered a terrific hurricane from sw. to nw., lasting twelve hours, and sustained damage to decks. On the 19th the disturbance, having moved slowly during the preceding twenty-four hours, was north of Scotland, causing strong gales over the British Isles and the English Channel. Heavy westerly and northwesterly gales continued over the ocean east of W. 40° from the 19th to 23d, the pressure remaining low to the north and northwest of the British Isles, while a region of high pressures occupied the ocean south of N. 52° and west of W. 15°.

X.—During the 23d the pressure began to decrease over the ocean between W. 20° and 40°, and by the 24th the pressure was least near N. 54° W. 30°, where the barometer read 28.6 (726.4). West of the fortieth meridian strong northwesterly gales prevailed, the barometric readings ranging from 29.5 (749.3) to 30.1 (764.5). The following are the reports of vessels which encountered the storm: s. s. "State of Indiana," J. H. Sadler commanding, in N. 52° 54', W. 31° 30', on the 24th reported barometer 28.6 (726.4), wind wnw., force 7, raining. S. s. "State of Georgia," G. Moodie commanding, reported, "November 24th, N. 56° 6', W. 16° 30', 0.8 p. m., Greenwich mean time, thick, blinding rain, wind coming in gusts and lulling again; at 3 p. m. wind fell light and veered to about S. 45° W., and the rain cleared away; large black masses of clouds were driven away to the eastward; force of wind about 5 to 6, sea moderately smooth, only a slight swell from S. 66° W., sky partially clear, with showers of rain at times." The following are the readings of the two aneroids:

Time.	Barometer.		Time.	Barometer.	
	Inches.	Mill.		Inches.	Mill.
3.55 p. m.	28.74	730.0	16.00 a. m.	28.44	722.4
4.15 p. m.	28.70	729.0	17.00 a. m.	28.42	721.9
6.00 p. m.	28.67	728.3	18.00 a. m.	28.43	721.9
8.00 p. m.	28.65	727.7	18.30 a. m.	28.43	722.1
11.00 p. m.	28.58	725.9	20.00 a. m.	28.45	722.9
12.00 p. m.	28.56	725.4			

S. s. "Waesland," H. Nickels commanding, reported: "November 23d, in N. 50° 18', W. 26° 30', at 15 hours, Greenwich mean time, moderate sw. gale veering gradually to w., with drizzling rain, barometer 29.56 (750.8), wind increasing in force. At noon, November 24th, blowing a violent gale, with a succession of squalls of hurricane force; ship's position at noon, N. 50° 18', W. 28° 04', barometer 29.31 (744.5), still falling. November 24th, 8 h'rs 30 m., Greenwich mean time, in N. 50° 18', W. 28° 20', barometer 29.21 (741.9), wind nw. by w., force 10, terrific rain and hail squalls, with tremendous sea running and breaking on deck with great force; ship's head to the wind on the starboard tack; engine slowed down. Towards midnight wind blowing almost a hurricane, causing a fearful sea, which smashed and displaced boats, stove in the pilot-

house and sky lights, and did other damage around the decks; at 23 h's wind moderating a little, barometer rising."

S. s. "Daniel Steinmann," H. Schoonhoven commanding, between N. 49° 34', W. 26° 27', and N. 48° 54', W. 30° 33', reported as follows: "24th, 3 a. m., wind w. by s., force 8, barometer 29.52 (749.8); 10 a. m., wind w. $\frac{1}{2}$ n., force 10; 2 p. m., wind w. by n., force 10, barometer 29.38 (746.2); 5 p. m., wind same force and direction, accompanied by blinding hail and rain till 9 p. m., fearful westerly sea, with hurricane squalls; 11 p. m., barometer 29.28 (743.7); 25th, 3 a. m., wind wnw., force 10, barometer 29.33 (745.0); 10 a. m., squalls less furious, barometer 29.38 (746.2); 2 p. m., wind wnw., force 9, barometer 29.56 (750.8); after that the wind blew a moderate gale, with steadily rising barometer; 6 p. m., wind nw. by w., force 5, barometer 29.68 (753.9)."

S. s. "Llandaff City," T. L. Weiss commanding, furnishes the following:

Date.	Greenwich time.	Barometer.		Wind.		Latitude N.	Longitude W.
		Inches.	Mill.	Dir.	Force		
24	h. m.						
24	17 12	28.92	734.6	ww.	7	51° 06'	17° 54'
24	21 14	28.84	733.5	w.	7		
24	23 15	28.78	731.0	w.	7		
25	4 45	28.65	727.7	w.	6		
25	9 18	28.70	729.0	nw.	7		
25	11 19	28.80	731.5	wnw.	7		
25	13 30	28.82	732.0	n.	7	51° 01'	20° 34'
25	15 31	28.95	735.3	wnw.	7		
25	17 22	29.08	738.6	nw.	7		
25	19 23	29.22	742.2	nw.	6		
25	21 20	29.30	744.2	nw.	6		
25	23 28	29.35	745.5	nw.	7	50° 41'	22° 20'

This depression was very extensive, the pressure being below 29.00 (736.6) over the region from W. 15° to W. 32°, and to the north of 52° north latitude; vessels on that parallel reported barometer 29.0 (736.6) to 29.1 (739.1). On the 25th the region of least pressure was to the northwest of Ireland, and was indicated by the isobar for 28.5 (723.9), while to the westward, as far as the twenty-third meridian, and southward to N. 49°, the pressure ranged from 28.7 (729.0) to 28.9 (734.0). The following reports are given: s. s. "Ohio," G. Meyer commanding, in N. 48° 11', W. 7° 14', reported:

	Barometer.		Wind.		Remarks.
	Inches.	Mill.	Dir.	Force.	
Nov. 25th.					
3 a. m.	29.15	740.4	sw.	7	Stormy weather, covered, mostly rain, and very heavy sea swell from nw.
4 a. m.	29.15	740.4	sw.	7	
6 a. m.	29.13	739.9	sw.	7	
4 p. m.	29.14	740.1	ww.	6	
Midnight.	29.18	741.2	ww.	8	

S. s. "Circassian," W. H. Smith, R. N. R., commanding, reports: "25th, a. m., moderate breezes, with frequent showers and smooth water, wind nw., force 3; at 5 a. m., Greenwich mean time, latitude 54°, 55' N., longitude 17° 10' W., barometer, lowest reading, 28.56 (725.4), wind shifted to the ne. and freshened, barometer rising. At noon strong and increasing gales, with heavy sea, wind backing to the northward; midnight, wind nw., strong gales, with heavy squalls and high sea." S. s. "Westphalia," F. Bornmüller commanding, reported in N. 49° 53', W. 11° 21', on the 25th, barometer 28.7 (729.0), wind n., force 6, raining; s. s. "Pennsylvania," G. C. Dodge commanding, reported, 25th, in N. 50° 53', W. 21° 56', barometer 28.91 (734.3), wind n., force 7, cloudy; s. s. "Holland," J. Milligan commanding, 25th, in N. 49° 17', W. 22° 25', barometer 28.97 (735.8), wind wnw., force 9, cloudy; and the s. s. "Germanic," C. W. Kennedy commanding, 25th, in N. 51° 16', W. 10° 45', barometer 28.63 (727.2), wind wsw., force 7, showery.

From the twenty-fifth meridian westward to W. 40°, strong northwesterly and northerly gales prevailed, with pressure ranging from 29.2 (741.7) to 29.9 (759.4).

XI.—On the 25th there was a decrease of pressure off the coast of Nova Scotia. Moving east-northeastward, attended by rapidly decreasing pressure, the storm-centre became well-defined in about N. 50°, W. 38°, on the 26th, on which date the pressure at the centre was 28.7 (729.0). The s. s. "State of Indiana," in N. 49° 38', W. 39° 00', reported barometer 28.7 (729.0), wind ene., force 10, heavy rain; and s. s. "Republic," in N. 49° 24', W. 37° 40', barometer 28.84 (732.5), wind wsw., force 6, squalls.

Captain Willigerod, of the s. s. "Elbe," furnishes the following report:

Date.	Barometer.		Wind.		Remarks.
	Inches.	Mill.	Dir.	Force.	
Nov. 26, 8 a. m.	29.06	738.0	sw.	8-9	Wind fell light, hauling to s. and se.
" " noon	28.85	733.9	sw-e.	light	High swell from sw., wnw., ne.; constantly raining. (Position, N. 47° 48', W. 39° 13').
" " 2 p. m.	28.82	732.0	n.	8	Squally; clearing in nw. horizon.
" " 4 p. m.	28.85	732.7	.....	.....	Moderate gale; high sw. swell.
" " 8 p. m.	28.94	735.1	nnw.	8-10	Blowing hard in squalls; hail and rain.
Midnight	29.08	738.5	nnw.	8-10	
Nov. 27, 4 a. m.	29.10	739.1	nnw.	8-10	Blowing hard in squalls; tremendous sea; ship working fearfully and shipping much water; after daylight, clearing.

Captain Irving, of the s. s. "Republic," reported as follows: 26th, 2 a. m. (ship's time, midnight), in N. 49° 50', W. 34° 30', barometer 29.78 (756.4) and falling rapidly, wind light and unsteady from sw.; 6 a. m., barometer 29.38 (746.2), wind se., force 8, constant rain and confused sea; 8 a. m., barometer 29.00 (736.6), wind se., force 9; 9.30 a. m., barometer 28.82 (732.0), wind falling light, with heavy rain, and suddenly shifting to nnw.; 12 m., barometer 28.80 (731.5), confused sea, wind unsteady from nw. to n., and blowing in gusts; 2 p. m., (ship's time, noon), in N. 49° 08', W. 38° 20', barometer 28.80 (731.5), wind light and unsteady from ne.; 4 p. m., wind freshened from ne., and increased; 5 p. m., wind ne., force 10, heavy sea, barometer with a tendency to rise; 8 p. m., barometer 29.12 (739.6), wind ne., force 10, with terrific squalls; 10 p. m., barometer 29.35 (745.5), wind inclining to n., with hard squalls, sky breaking in nw.; 12 p. m., weather clearing, barometer slowly rising, and wind settling into a steady nne. gale, with a heavy sea. Mean temperature throughout, air, 42° (5° 6 C.), sea-water, 53° (11° 7 C.).

Captain H. Nickels, of the s. s. "Waesland," reports: 26th, 9 p. m. (between N. 49° 05', W. 33° 25', and N. 48° 05', W. 38° 15'), a sudden calm and light, variable airs, barometer 28.94 (735.1); 10 p. m., breeze springing up from nne., increasing rapidly in force; midnight, blowing a violent gale, hail squalls, with hurricane force, tremendous sea running and breaking over the ship, rapidly rising barometer; during the forenoon of the 27th the wind and squalls moderated.

West of 45° W. longitude the pressure was from 29.7 (754.4) to 30.0 (762.0), and very strong w. to nw. gales were reported. On the 27th the centre of disturbance was in N. 42°, W. 26°, with heavy s. and ssw. gales to the eastward, and squally, violent n. and nw. gales to the westward. S. s. "Lake Manitoba," P. D. Murray commanding, reported as follows: "27th, 6 a. m. (in N. 54°, W. 26°), barometer 28.35 (720.1), wind ne., fresh, very heavy s. and w. sea; 3 p. m., barometer 28.42 (721.9), wind n., light, confused sea; 10 p. m., moderate wind, wnw.; noon of the 28th, barometer 29.30 (744.2), wind wsw., clear weather, high sw. sea."

Captain Weiss, of the s. s. "Llandaff City," in N. 50° 11', W. 28° 22', reported as follows: "During the past twenty-four hours there has been a great depression of the atmosphere, the barometer falling to 28.70 (729.0) at 12 h. (Greenwich mean time), after which it began to rise rapidly. The wind during the night of the 26th veered from w. to ese., with rain, then hauling back to n., with dirty weather, lightning to the s., se., and ne."

Captain Sander, of the s. s. "Oder," in N. 49° 20', W. 27° 51', reported barometer 28.72 (729.5), wind sw. to n., force 5 to 8; and the s. s. "Westphalia," F. Bornmueller commanding,

in N. 49° 28', W. 24° 42', barometer 28.6 (726.4), wind ssw., force 7.

On the 28th the disturbance was at some distance off the northwest coast of Ireland, the pressure having increased to 29.2 (741.7).

XII.—This disturbance appeared south of Newfoundland on the 29th, and was probably identical with a slight depression which passed to the eastward over the Gulf of Saint Lawrence on the 28th. The s. s. "Neckar," R. Bussius commanding, reported, in N. 44° 03', W. 52° 08', barometer 29.39 (746.5), wind w. to se., force 3 to 7; the s. s. "Waesland," H. Nickels commanding, reported, in N. 45° 55', W. 49° 34', barometer 29.58 (751.3), wind se., force 6, raining. Captain Sadler, of the s. s. "State of Indiana," in N. 44° 27', W. 56° 58', reported barometer 29.6 (751.8), wind n., force 7.

Vessels in N. 49°, W. 52° and 54°, reported strong e. and se. gales. On the 30th the region of least pressure was transferred to about N. 50°, W. 40°, where the barometer ranged from 29.7 (754.4) to 29.84 (757.9), with moderate to strong s. winds to the eastward, and moderate n. and nw. winds in the rear of the depression.

XIII.—This depression appears to have occupied the region between Madeira and the Western Islands from the 27th to the 30th. Owing to the small number of reports received from that region, its origin and subsequent track cannot, as yet, be defined. The following reports, however, are given as showing the existence of the disturbance: s. s. "Weser," H. Bruns commanding, in N. 30° 00', W. 34° 45', on the 27th, barometer 30.03 (762.7), being a fall of .15 inch since last observation, wind shifting from sse., force 3, to nw., force 5, squally. S. s. "Burswell," J. Wallace commanding, in N. 35° 59', W. 18° 25', on the 28th, barometer 29.79 (756.7), a fall of .3 inch, wind sw., force 4, stormy weather; 29th, in N. 35° 42', W. 21° 50', barometer 29.61 (751.8), wind s., force 4, very stormy; 30th, in N. 35° 16', W. 25° 36', barometer 29.7 (754.4), wind ese., force 3, squally. The s. s. "Ohio," G. Meyer commanding, on the 29th, in N. 39° 06', W. 18° 15', reported barometer 29.84 (757.9), wind sse., force 7; 30th, in N. 37° 14', W. 22° 49', barometer 29.89 (759.2), wind se., force 4. Both the "Burswell" and "Ohio" had heavy rain during the 29th and 30th.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

In the first column of the following table are shown the normal temperatures of November in the several districts, as determined from the Signal Service records; the second column shows the mean temperature of November, 1883, and the third column shows the departures of November, 1883, from the normal:

Average Temperatures for November, 1883.

Districts.	Average for November, Signal-Service observations.		Comparison of Nov., 1883, with the average for several years.
	For several years.	For 1883.	
New England	39.9	42.7	2.8 above.
Middle Atlantic states.....	45.3	48.0	2.7 above.
South Atlantic states.....	54.9	56.9	2.0 above.
Florida peninsula	66.8	68.0	1.2 above.
Eastern Gulf	55.6	58.2	2.6 above.
Western Gulf	56.1	60.2	4.1 above.
Rio Grande valley.....	65.0	68.8	3.8 above.
Tennessee	48.7	52.2	3.5 above.
Ohio valley.....	43.0	47.3	4.3 above.
Lower lakes.....	37.4	41.6	4.2 above.
Upper lakes.....	33.5	35.8	2.3 above.
Extreme northwest.....	23.8	24.0	0.2 above.
Upper Mississippi valley.....	38.0	41.8	3.8 above.
Missouri valley.....	34.8	37.1	2.3 above.
Northern slope.....	29.6	32.6	3.0 above.
Middle slope.....	37.1	44.7	7.6 above.
Southern slope.....	51.8	54.0	2.2 above.
Northern plateau.....	35.4	42.7	7.3 above.
Southern plateau.....	40.5	47.9	7.4 above.
North Pacific.....	43.6	45.9	2.3 above.
Middle Pacific.....	53.8	51.5	2.3 below.
South Pacific.....	57.8	58.9	1.1 above.
Mount Washington, N. H.	16.5	19.5	3.0 above.
Pike's Peak, Colo.....	10.3	13.8	3.5 above.
Salt Lake City, Utah	37.4	39.0	1.6 above.

The distribution of mean temperature over the United States and Canada for the month of November, 1883, is exhibited on chart iii. by the dotted isothermal lines.

The general distribution of mean temperature, with the districts of maximum departures from the normal, for the month of November in each year, from 1873 to 1882, inclusive, are as follows:

Districts.	Maximum departures.	Year.	Remarks.
New England.....	- 7.0	1873...	Normal in the Gulf states and in the lower Missouri and lower Mississippi valleys; below the normal in all other districts east of the Rocky mountains.
Minnesota.....	- 5.5		
Lower lakes.....	- 4.5		
Middle Atlantic states.....	- 4.0		
Gulf states.....	+ 4.8	1874...	Normal in New England and in the lower Missouri valley; below the normal on the Pacific coast, in Minnesota, and in the Saint Lawrence valley; above the normal in the lake region, the upper Mississippi and Ohio valleys, and in the middle and south Atlantic states.
Ohio valley and Tennessee.....	+ 3.9		
South Atlantic states.....	+ 1.6		
Minnesota.....	- 2.3		
Saint Lawrence valley.....	- 1.3	1875...	Above the normal on the Pacific coast, in the Ohio valley, south Atlantic, and east Gulf states; below the normal over the northern districts from the Missouri valley to New England.
Pacific coast.....	- 0.7		
Gulf states.....	+ 5.7		
Ohio valley and Tennessee.....	+ 2.0		
Saint Lawrence valley.....	- 6.0	1876...	Normal in the upper Mississippi valley; above the normal on the Pacific coast, in the lake region, Saint Lawrence and Ohio valleys, New England and the middle Atlantic states; below the normal in the Missouri valley and in the south Atlantic and Gulf states.
Minnesota.....	- 5.3		
New England.....	- 5.2		
Lower lakes.....	+ 3.1		
Saint Lawrence valley.....	+ 2.5	1877...	Above the normal on the Pacific coast and in all districts east of the Rocky mountains, except in the Gulf states.
Upper lakes.....	+ 2.3		
Middle Atlantic states.....	+ 2.3		
Missouri valley.....	- 4.5		
Minnesota.....	- 2.8	1878...	Normal on the Pacific coast; above the normal in all districts east of the Rocky mountains, the departures in the south Atlantic and Gulf states being less than 1°.
Minnesota.....	+ 6.3		
New England.....	+ 6.1		
Lower lakes.....	+ 5.1		
Middle Atlantic states.....	+ 5.1	1879...	Below the normal west of the Rocky mountains and in the Canadian Maritime Provinces; above the normal in all other districts.
Gulf states.....	- 2.3		
Upper Missouri valley.....	+ 13.7		
Minnesota.....	+ 13.4		
Upper Mississippi valley.....	+ 7.8	1880...	Below the normal over the entire country, the departures being least in the Atlantic coast districts.
Missouri valley.....	+ 7.0		
Upper lakes.....	+ 6.0		
Western Gulf.....	+ 5.1		
Ohio valley and Tennessee.....	+ 4.6	1881...	Normal in the west Gulf states; below the normal west of the Rocky mountains, in the northern and middle slopes, Rio Grande valley, and Minnesota; above the normal in the Missouri valley and in all districts east of the Mississippi river.
Eastern Gulf.....	+ 3.8		
Boise City, Idaho.....	- 4.8		
Salt Lake City, Utah.....	- 3.2		
Canadian Maritime stations.....	- 2.3	1882...	Below the normal on the Atlantic and Pacific coasts and in the northern and middle plateau districts; above the normal in all other parts of the country.
Rio Grande valley.....	- 12.4		
Middle slope.....	- 12.2		
Southern slope.....	- 11.2		
Northern plateau.....	- 8.1	1883...	
Upper Mississippi valley.....	- 7.5		
Florida peninsula.....	+ 5.6		
South Atlantic states.....	+ 3.2		
Ohio valley.....	+ 3.2	1884...	
Salt Lake City, Utah.....	- 4.5		
Middle Pacific coast.....	- 2.4		
Upper Mississippi valley.....	+ 4.6		
Upper lakes.....	+ 4.3	1885...	
Extreme northwest.....	+ 4.1		
Northern plateau.....	- 4.4		
Middle Pacific coast.....	- 2.3		

The mean temperature of November, 1883, has been above the normal of the corresponding month in all parts of the United States, except in the middle Pacific coast region, where it averaged 2° 3 below the normal. The most marked departures occurred in the middle slope and northern plateau, where they amounted to 7° 6 and 7° 3, respectively. In the western Gulf states, Ohio valley, and lower lake region, the departures varied from 4° 1 in the first named district to 4° 3 in the Ohio valley. In the extreme northwest the mean temperature was nearly normal, the departure being but 0° 2 above, and in the Florida peninsula it averaged 1° 2 above. In the other districts east of the Rocky mountains the departures above the normal temperature varied from 2° to 3° 8. In the northern and southern Pacific coast regions and in the middle and southern plateau districts the departures ranged from 1° 1 to 2° 3. On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the mean temperatures were 3° 0 and 3° 5 above the normal, respectively. At Salt Lake City, Utah, the

mean temperature averaged 1° 6 above the normal of the last nine years.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.	Stations reporting lowest.
Key West, Florida..... 75.0	Pike's Peak, Colorado..... 13.8
Brownsville, Texas..... 69.2	Saint Vincent, Minnesota..... 18.6
Rio Grande City, Texas..... 68.3	Mount Washington, New Hampshire..... 19.5
Sanford, Florida..... 67.3	Poplar River, Montana..... 20.0
Indianola, Texas..... 66.3	Fort Buford, Dakota..... 22.4
Cedar Keys, Florida..... 65.8	Moorhead, Minnesota..... 23.2
Galveston, Texas..... 65.0	Fort Assiniboine, Montana..... 25.1
New Orleans, Louisiana..... 63.5	Bismarck, Dakota..... 25.1
Jacksonville, Florida..... 63.3	Fort Maginnis, Montana..... 29.2
Pensacola, Florida..... 61.5	Duluth, Minnesota..... 29.7
Mobile, Alabama..... 60.3	Fort Shaw, Montana..... 30.0

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for November, 1883. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: mean temperature, 50° 0, is 3° 2 above the November average of the last two years.

Illinois.—Riley, McHenry county: mean temperature, 35° 5,

is 2° 4 above the November average of the last twenty-three years. The mean temperature of the autumn of 1883 is 0° 6 below the average of the last twenty autumns.

Anna, Union county: mean temperature, 49° 3, is 3° above the November average of the last eight years.

Mattoon, Coles county: mean temperature, 44° 8, is about 6° above the November average of the past four years.

Indiana.—Wabash, Wabash county: mean temperature, 43° 6, is 3° 8 above the November average of the last eight years.

Logansport, Cass county: mean temperature, 42° 3, is 2° 2 above the November average of the last twenty-four years. The highest November mean temperature since 1859 (48° 0) occurred in 1862; the lowest (30° 3) occurred in 1880.

Kansas.—Independence, Montgomery county: mean temperature, 46° 3, is 2° 8 above the November average of the last twelve years.

Wellington, Sumner county: mean temperature, 42° 6, is 3° 8 above the November average of the four preceding years.

Lawrence, Douglas county: mean temperature, 42° 8, is 3° 6 above the November average of the last sixteen years.

Maine.—Gardiner, Kennebec county: mean temperature, 38° 4, is 2° 3 above the November average of the last forty-seven years.

Table of Comparative Minimum Temperatures for the Month of November.

State or Territory.	Minimum for November, 1883, Signal Service.		Minimum since Signal-Service stations were opened—3 to 12 years.			Lowest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
Alabama.....	Montgomery.....	0	Montgomery.....	0	1881	Huntsville.....	0	13	9 years.
Arizona.....	Fort Apache.....	29	Prescott.....	34.6	1880	Whipple Barracks.....	-1	1	9 "
Arkansas.....	Fort Smith.....	25	Little Rock.....	10	1880	Fort Smith.....	6	6	21 "
California.....	Sacramento.....	29	Campo.....	10	1881	Fort Bidwell.....	9	9	11 "
Colorado.....	Pike's Peak.....	-13	Pike's Peak.....	-18	1880	Fort Garland.....	-35	3	30 "
Do.....	West Las Animas.....	8	Denver.....	-18	1877	Pagosa Springs.....	-38	1880	3 "
Connecticut.....	New Haven.....	18	New Haven.....	2	1875	New Haven.....	2	2	87 "
Dakota.....	Fort Buford.....	-19	Pembina.....	-40	1874	Fort Buford.....	-37	10	10 "
Delaware.....	Delaware Breakwater.....	25	Delaware Breakwater.....	23	1880	Fort Delaware.....	33	12	44 "
District of Columbia.....	Washington.....	21	Washington.....	12.5	1880	Washington.....	12	12	49 "
Florida.....	Pensacola.....	36	Saint Marks.....	37	1877	Fort Barrancas.....	19	19	39 "
Georgia.....	Atlanta.....	20	Atlanta.....	30	1881	Atlanta.....	10	10	7 "
Idaho.....	Coeur d'Alene.....	14	Eagle Rock.....	-14	1880	Fort Hall.....	-12	12	4 "
Illinois.....	Chicago.....	10	Chicago.....	-3	1880	Augusta.....	-7	7	8 "
Do.....	Indianapolis.....	10	Indianapolis.....	-2	1880	Rock Island Arsenal.....	-14	1880	13 "
Indiana.....	Indianapolis.....	10	Indianapolis.....	-5	1880	Spice Land.....	0	0	53 "
Indian Territory.....	Des Moines.....	6	Dubuque.....	-9	1875	Fort Gibson.....	-17	17	18 "
Iowa.....	Leavenworth.....	16	Dodge City.....	-9	1880	Independence.....	-17	17	18 "
Kansas.....	Leavenworth.....	16	Dodge City.....	-9	1880	Fort Leavenworth.....	-14	14	31 "
Kentucky.....	New Orleans.....	37	Shreveport.....	18	1880	Newport Barracks.....	4	4	30 "
Louisiana.....	Eastport.....	12	Eastport.....	-13	1875	Fort Jessup.....	17	17	23 "
Maine.....	Portland.....	22	Boston.....	-9	1875	Orono.....	-16	16	23 "
Do.....	Ocean City.....	22	Baltimore.....	15	1880	Brunswick.....	-3	3	53 "
Maryland.....	Boston.....	14	Boston.....	-2	1875	Emmitsburg.....	7	7	12 "
Massachusetts.....	Provincetown.....	23	Springfield.....	-0.5	1875	Williamstown.....	-3	3	67 "
Do.....	Escanaba.....	-1.5	Escanaba and Marquette.....	-9	79, '80	Florida.....	-14	1875	4 "
Michigan.....	Marquette.....	-2	Duluth.....	-29	1875	Fort Brady.....	-17	1875	59 "
Minnesota.....	Saint Vincent.....	-2	Duluth.....	-29	1875	Fort Ripley.....	-30	30	17 "
Mississippi.....	Moorhead.....	-14	Vicksburg.....	23	77, '80	Columbus.....	22	22	10 "
Missouri.....	Vicksburg.....	28	Saint Louis.....	8	1880	Allenton.....	-5	5	4 "
Montana.....	Saint Louis.....	18	Fort Benton.....	-31	1875	Camp Baker.....	-42	42	9 "
Nebraska.....	Omaha.....	-23	North Platte.....	-10	1877	Camp Sheridan.....	-17	1880	6 "
Nevada.....	Omaha.....	7	Winnemucca.....	-9	1880	Camp Halleck.....	-12	12	11 "
New Hampshire.....	Mount Washington.....	-17	Mount Washington.....	-40	1875	Grafton.....	-16	1880	2 "
Do.....	Mount Washington.....	-17	Mount Washington.....	-40	1875	Dartmouth College.....	-9	9	18 "
New Jersey.....	Barnegat City.....	19	Sandy Hook.....	8	1875	North Germantown.....	6	1875	2 "
Do.....	Barnegat City.....	19	Atlantic City.....	10	1875	Newark.....	8	1875	38 "
New Mexico.....	Rochester.....	16	Santa Fé.....	-11	1880	Fort Union.....	-15	1880	31 "
New York.....	Rochester.....	16	Albany.....	-10	1875	Canton.....	-20	1875	3 "
Do.....	Rochester.....	16	Albany.....	-10	1875	Gouverneur.....	-17	17	40 "
North Carolina.....	Charlotte.....	20	Charlotte.....	18	1880	Fort Johnson.....	9	9	54 "
Ohio.....	Columbus.....	12	Columbus.....	-5	1880	College Hill.....	-2	2	68 "
Do.....	Toledo.....	14	Cleveland.....	0	1880	Westerville.....	-13	1880	9 "
Oregon.....	Roseburg.....	27	Umatilla.....	9	1880	Camp Harney.....	4	4	12 "
Do.....	Roseburg.....	27	Umatilla.....	9	1880	Fort Dallas.....	4	4	16 "
Pennsylvania.....	Pittsburg.....	15	Pittsburg.....	4	1880	Franklin.....	-8	1880	8 "
Do.....	Erie.....	19	Erie.....	0	1880	Philadelphia.....	12	12	113 "
Rhode Island.....	Narragansett Pier.....	17	Newport.....	4	1875	Fort Adams.....	3	1875	41 "
South Carolina.....	Charleston.....	30	Charleston.....	28	73, '81	Aiken.....	23	1880	8 "
Do.....	Charleston.....	30	Charleston.....	28	73, '81	Charleston.....	28	28	105 "
Tennessee.....	Nashville.....	16	Knoxville.....	15	73, '81	Clarksville.....	-3	1880	8 "
Texas.....	Fort Elliott.....	20	Fort Elliott.....	-5	1880	Fort Elliott.....	-8	1880	3 "
Utah.....	Salt Lake City.....	17	Salt Lake City.....	3	1880	Coalville.....	-18	1880	9 "
Vermont.....	Burlington.....	-10	Burlington.....	-10	1875	Newport.....	-18	1875	10 "
Virginia.....	Lynchburg.....	13	Lynchburg.....	13	1880	Snowville.....	9	1880	8 "
Do.....	Lynchburg.....	13	Norfolk.....	21	1879	Fort Monroe.....	15	1880	56 "
Washington.....	Spokane Falls.....	20	Spokane Falls.....	3	1881	Fort Colville.....	-8	1880	20 "
West Virginia.....	Morgantown.....	8	Morgantown.....	8	1880	Helvetia.....	0	1880	4 "
Wisconsin.....	La Crosse.....	3	Milwaukee.....	-14	1875	Neillsville.....	-36	1880	8 "
Do.....	La Crosse.....	3	La Crosse.....	-21	1875	Fort Crawford.....	-13	1880	25 "
Wyoming.....	Cheyenne.....	16	Fort Washakie.....	-23	1882	Fort Bridger.....	-40	1880	24 "

Table of Maximum and Minimum Temperatures for November, 1883.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama.....	Montgomery.....	62	0	Mt. Vernon Bar'ks..	6	0
Do.....	Mobile.....	52	29	Green Springs.....	84	27
Arizona.....	Maricopa.....	85	33	Maricopa.....	93	34
Do.....	Fort Apache.....	72	16	Willcox.....	81	24
Arkansas.....	Fort Smith.....	72	25	Lead Hill.....	83	13
Do.....	Little Rock.....	75	29	Mount Ida.....	70	20
California.....	Los Angeles.....	84	42	Borden.....	100	39
Do.....	Sacramento.....	71	29	Summit.....	42	8
Colorado.....	West Las Animas..	77	5	Fort Lyon.....	76	7
Do.....	Pike's Peak.....	31	-13	Fort Lewis.....	59	8
Connecticut.....	New Haven.....	63	18	Southington.....	65	12
Dakota.....	Fort Sully.....	70	3	Fort Meade.....	71	7
Do.....	Fort Buford.....	58	-19	Fort Pembina.....	57	-23
Delaware.....	Del. Breakwater.....	70	25	Rock Creek Bridge..	76	19
District of Columbia.....	Washington.....	72	21	Limona.....	96	48
Florida.....	Key West.....	86	67	Newport.....	79	30
Do.....	Pensacola.....	80	36	Forsyth.....	84	28
Georgia.....	Augusta.....	82	28	Camp Mitchell.....	76	13
Do.....	Atlanta.....	76	29	Fort Lapwal.....	63	23
Idaho.....	Coeur d'Alene.....	59	14	Bunker Hill.....	75	6
Illinois.....	Chicago.....	74	15	Polo.....	57	0
Indiana.....	Indianapolis.....	65	10	Marengo and Vevay..	76	12
Do.....	Indianapolis.....	65	10	Lafayette.....	64	4
Iowa.....	Keokuk.....	68	12	Logan.....	70	8
Do.....	Des Moines.....	67	6	Cresco.....	60	-3
Kansas.....	Leavenworth.....	73	16	Fort Scott.....	76	15
Do.....	Leavenworth.....	73	16	Holton.....	75	7
Kentucky.....	Louisville.....	75	16	Bowling Green.....	72	9
Do.....	Louisville.....	75	16	Frankford.....	73	13
Louisiana.....	New Orleans.....	81	37	Grand Coteau.....	83	32
Maine.....	Portland.....	62	17	Fort Preble.....	62	18
Do.....	Eastport.....	58	12	Orono.....	58	9
Maryland.....	Baltimore.....	71	23	Sandy Springs.....	73	14
Do.....	Ocean City.....	62	22	Emmitsburg.....	70	12
Massachusetts.....	Boston.....	69	14	Westborough.....	74	16
Do.....	Provincetown.....	62	23	Heath.....	68	8
Michigan.....	Detroit.....	67	14	Thornville.....	65	6
Do.....	Escanaba.....	55	-1.5	Ionis.....	62	5
Minnesota.....	Saint Paul.....	60	0	Northfield.....	60	0
Do.....	Saint Vincent.....	57	-22	Minneapolis.....	59	-2
Mississippi.....	Vicksburg.....	82	28	Sedalia.....	78	9
Missouri.....	Saint Louis.....	72	18	Centerville.....	70	5
Do.....	Saint Louis.....	72	18	Fort Assiniboine.....	65	-20
Montana.....	Fort Assiniboine.....	62	-23	Fort Ellis.....	61	-27
Do.....	Fort Shaw.....	61	-23	Red Willow.....	70	10
Nebraska.....	North Platte.....	67	12	Fremont.....	66	3
Do.....	Omaha.....	65	7	Golconda.....	75	15
Nevada.....	.....	.....	.....	Tecoma.....	52	-9
Do.....	.....	.....	.....	Contoocookville.....	73	15
New Hampshire.....	Mount Washington..	46	-17	New Market.....	70	12
Do.....	Mount Washington..	46	-17	Vineland.....	77	16
New Jersey.....	Sandy Hook.....	67	23	Summerville.....	62	16
Do.....	Barnegat City.....	63	19	Fort Union.....	71	5
New Mexico.....	.....	.....	.....	Fort Wingate.....	64	15
Do.....	.....	.....	.....	Johnstown.....	70	0
New York.....	Oswego.....	70	20	Fort Hamilton.....	76	21
Do.....	Rochester.....	69	16	Chapel Hill.....	83	17
North Carolina.....	Wash Woods.....	83	30	Highland.....	65	9
Do.....	Charlotte.....	78	20	Portsmouth.....	77	14
Ohio.....	Cincinnati.....	74	19	Wauseon.....	66	0
Do.....	Columbus.....	72	12	Albany.....	61	36
Oregon.....	Portland.....	60	34	Eola.....	58	32
Do.....	Roseburg.....	59	27	Fallington.....	74	15
Pennsylvania.....	Pittsburg.....	73	15	Grampian Hill.....	64	4
Do.....	Philadelphia.....	73	25	Aiken.....	80	24
Rhode Island.....	Block Island.....	64	24	Dyersburg.....	78	17
Do.....	Narragansett Pier..	62	17	Grand View.....	69	10
South Carolina.....	Charleston.....	80	30	Austin.....	88	39
Tennessee.....	Memphis.....	77	20	Cleburne.....	84	28
Do.....	Nashville.....	75	16	Nephi.....	66	5
Texas.....	Rio Grande City.....	93	44	Promontory.....	52	0
Do.....	Fort Elliott.....	77	20	Charlotte.....	72	10
Utah.....	Salt Lake City.....	64	17	Dorset.....	71	6
Do.....	Salt Lake City.....	64	17	Johnsontown.....	79	25
Vermont.....	.....	.....	.....	Marion.....	72	10
Do.....	.....	.....	.....	Fort Spokane.....	60	14
Virginia.....	Cape Henry.....	81	26	Bainbridge Island..	60	20
Do.....	Fort Myer.....	72	18	Helvetia.....	70	10
Washington.....	Olympia.....	57	29	Neillsville.....	59	-6
Do.....	Spokane Falls.....	58	20	Ripon.....	63	0
West Virginia.....	.....	.....	.....	Fort Bridge.....	56	2
Wisconsin.....	Milwaukee.....	60	5	.....	.....	.....
Do.....	La Crosse.....	59	3	.....	.....	.....
Wyoming.....	Cheyenne.....	66	16	.....	.....	.....

Maryland.—Fallston, Harford county: mean temperature, 44°.8, is 2°.8 above the November average of the last thirteen years.

Missouri.—Saint Louis: mean temperature, 46°.7, is 3°.8 above the November average of the last forty-eight years; it is 3°.3 below the mean of the warmest November, and 14°.6 above the coolest November of that period.

New Hampshire.—Contoocookville, Merrimack county: mean temperature, 39°.9, is 6°.5 above the November average of the last twelve years, and is the highest November mean of that

period, with the exception of November, 1877, which was about 1° higher.

New York.—Palermo, Oswego county: mean temperature, 36°.4, is 0°.9 above the November average of the last thirty years.

North Volney, Oswego county: mean temperature, 38°.6, is 3°.3 above the average of the last sixteen years. The mean temperature of the autumn of 1883 (47°.5), is 0°.8 below the autumnal average of the last sixteen years. The warmest autumn of that period was that of 1881, mean 52°.5; the coldest was that of 1875, mean 44°.0.

Ohio.—Wauseon, Fulton county: mean temperature, 40°.3, is 5°.4 above the November average of the last thirteen years, and is the highest November mean of that period; the lowest November mean, 27°.9, occurred in 1880. The extremes for November, 1883, are: maximum, 66°; minimum, 6°. The November extremes for the last thirteen years are: maximum, 74°.6, in 1872; minimum, -8°.5, in 1880.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 37°.9, is 3°.6 above the November average of the last sixteen years. The highest November mean of that period, 38°.2, occurred in 1881; the lowest, 26°.4, occurred in 1873.

Texas.—New Ulm, Austin county: mean temperature, 61°.6, is 2°.5 above the November average of the last twelve years. The highest November mean of that period, 65°.6, occurred in 1879; the lowest, 49°.6, occurred in 1880. The extremes for the same period are: maximum, 94° in 1882; minimum, 16° in 1872.

Virginia.—Variety Mills, Nelson county: mean temperature, 45°.7, is 1°.3 above the November average of six years. The mean temperature of the autumn of 1883 (September 1st to November 30th) is 55°.2, or 1°.6 below the autumnal average of the last six years.

Wytheville, Wythe county: mean temperature, 44°.6, is 2°.9 above the November normal.

West Virginia.—Helvetia, Randolph county: mean temperature, 45°.0, is 4°.8 above the November average of seven years.

Wisconsin.—Manitowoc, Manitowoc county: mean temperature, 36°.6, is 0°.9 above the November average of a period of thirty-two years, during which the highest November mean, 41°.1, occurred in 1865, and the lowest, 27°.8, occurred in 1880.

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature have been greatest in Montana, where, at Forts Shaw, Benton, and Assiniboine, they were 81°, 83°, and 85°, respectively. They have been least along the coasts of the Atlantic and Pacific oceans and Gulf of Mexico, the smallest ranges being 18° at Key West, Florida; 23° at Fort Canby, Washington Territory, and 24° at San Francisco, California. Monthly ranges of 60° or more occurred at the following stations: Columbus, Ohio, and Saint Paul, Minnesota, 60°; Des Moines, Iowa, 61°; Duluth, Minnesota, 62°; Mount Washington, New Hampshire, 63°; Yankton, Dakota, 64°; Forts Bennett and Sully, and Huron, Dakota, 67°; Moorhead, Minnesota, and West Las Animas, Colorado, 69°; Helena, Montana, 74°; Fort Maginnis, Montana, 76°; Fort Buford, Dakota, 78°; Fort Shaw, Montana, 81°; Fort Benton, Montana, 83°; Fort Assiniboine, Montana, 85°. Monthly ranges of 40° or less were reported as follows: Indianola, Texas, 40°; Provincetown, Massachusetts, and San Diego, California, 39°; Lewiston, Idaho, Spokane Falls, Washington Territory, and Galveston, Texas, 38°; Sanford, Florida, 32°; Roseburg, Oregon, 31°; Olympia, Washington Territory, 28°; Portland, Oregon, 26°; Fort Stevens, Oregon, 25°; San Francisco, California, 24°; Fort Canby, Washington Territory, 23°; Key West, Florida, 18°.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges of temperature have varied in the several districts as follows:

New England.—From 20° at Portland, Maine, on the 12th, to 31° at Boston, Massachusetts, on the 5th, and 34° on the summit of Mount Washington, New Hampshire, on the 12th.

Middle Atlantic states.—From 20° at Philadelphia, Pennsylvania, on the 12th, to 36° at New York City, New York, on the 13th.

South Atlantic states.—From 24° at Hatteras, North Carolina, and Jacksonville, Florida, on the 8th and 24th, respectively, to 31° at Augusta, Georgia, on the 6th.

Florida peninsula.—From 10° at Key West, on the 10th, to 26° at Cedar Keys, on the 4th.

Eastern Gulf.—From 22° at New Orleans, Louisiana, on the 17th, to 32° at Montgomery, Alabama, on the 13th.

Western Gulf.—From 19° at Indianola, Texas, on the 3d, to 35° at Fort Smith, Arkansas, on the 26th.

Rio Grande valley.—From 24° at Brownsville, Texas, on the 24th, to 26° at Rio Grande City, on the 3d.

Tennessee.—From 28° at Memphis, on the 19th, to 30° at Chattanooga, on the 3d.

Ohio Valley.—From 24° at Cincinnati, Ohio, on the 26th, to 31° at Indianapolis, Indiana, on same date.

Lower lakes.—From 22° at Erie, Pennsylvania, on the 13th, to 32° at Toledo, Ohio, on the 17th.

Upper lakes.—From 24° at Port Huron, Michigan, on the 26th, to 41° at Escanaba, Michigan, on same date.

Extreme northwest.—From 45° at Saint Vincent, Minnesota, on the 25th, to 48° at Fort Buford, Dakota, on the 12th.

Upper Mississippi valley.—From 28° at Keokuk, Iowa, on the 13th, to 39° at Des Moines, Iowa, on the 25th.

Missouri valley.—From 43° at Leavenworth, Kansas, and Omaha, Nebraska, on the 25th, and at Yankton, Dakota, on the 27th, to 53° at Fort Bennett, Dakota, on the 16th.

Northern slope.—From 36° at Cheyenne, Wyoming, on the 12th, to 62° at Fort Shaw, Montana, on the 28th.

Middle slope.—From 22° on the summit of Pike's Peak, Colorado, on the 26th, to 50° at West Las Animas, Colorado, on the 16th and 27th.

Southern slope.—From 41° at Fort Stockton, Texas, on the 24th, to 42° at Fort Cocho, Texas, on the 30th.

Southern plateau.—From 28° at Fort Grant, Arizona, on the 21st, to 46° at Fort Apache, Arizona, on the 30th.

Middle plateau.—25° at Salt Lake City, Utah.

Northern plateau.—From 26° at Spokane Falls, Washington Territory, on the 1st, to 37° at Dayton, Washington Territory, on same date.

North Pacific coast.—From 11° at Fort Canby, Washington Territory, on the 14th, to 22° at Roseburg, Oregon, on the 1st.

Middle Pacific coast.—From 14° at San Francisco, California, on the 29th, to 28° at Sacramento, California, on the 30th.

South Pacific coast.—From 31° at San Diego, California, on the 12th, to 38° at Los Angeles, California, on the 28th.

FROSTS.

Frosts were reported in the various districts on the following dates:

New England.—1st to 31st.

Middle Atlantic states.—1st to 5th, 8th, 12th to 20th, 25th to 30th.

South Atlantic states.—1st to 4th, 13th to 19th, 28th, 29th, 30th.

Eastern Gulf.—1st, 2d, 3d, 13th, 16th, 17th, 28th, 29th, 30th.

Western Gulf.—1st, 2d, 3d, 7th, 12th to 19th, 27th to 30th.

Tennessee.—1st, 2d, 3d, 5th, 6th, 7th, 12th to 17th, 19th, 25th, 27th, 28th, 29th.

Ohio valley.—1st to 5th, 7th, 12th to 21st, 25th to 30th.

Lower lakes.—1st to 5th, 7th, 8th, 11th to 20th, 25th, 27th to 30th.

Upper lakes.—1st to 4th, 6th to 30th.

Extreme northwest.—1st to 30th.

Upper Mississippi valley.—1st to 24th, 26th to 30th.

Missouri valley.—1st to 30th.

Northern slope.—1st, 3d to 29th.

Middle slope.—1st, 2d, 3d, 5th to 30th.

Southern plateau.—2d, 4th to 29th.

Middle plateau.—1st, 2d, 4th to 7th, 10th to 30th.

Northern plateau.—1st to 9th, 11th, 13th to 17th, 19th, 28th.

North Pacific.—2d, 3d, 4th, 7th, 8th, 23d, 24th, 25th, 28th, 29th, 30th.

Middle Pacific.—1st to 6th, 17th, 18th, 21st, 22d, 23d, 25th to 30th.

Frosts were also reported from the following stations:

Los Angeles, California, 24th.

Poway, California, 21st to 27th.

Archer, Florida, 3d.

Mayport, Florida, 2d, 3d, 4th, 16th, 29th, 30th.

Fort Elliott, Texas, 1st, 6th, 18th, 20th, 22d, 24th.

At Stateburg, South Carolina, tender vegetation was killed by the frost of the morning of the 2d.

ICE.

Under the heading "ice in rivers and harbors" in this REVIEW, the subject of ice-formation in the northern sections of the country is considered. In the southern states the following instances of ice-formation have been reported:

Alabama.—Montgomery, 16th.

Arizona.—Wickenburg, 20th to 26th; Fort Grant, 21st.

Arkansas.—Lead Hill, 1st, 2d, 12th to 17th, 27th, 28th, 29th; Little Rock, 2d, 16th; Fort Smith, 14th.

California.—Princeton, 4th, 5th, 25th; Sacramento, 25th to 30th.

Florida.—Pensacola: thin ice formed in exposed places in this city on the 16th.

Georgia.—Atlanta, 2d.

Louisiana.—Liberty Hill, 16th.

North Carolina.—Weldon, 2d, 3d; New River Inlet, 2d, 3d, 16th; Sloop Point, 13th; Charlotte, 13th, 15th, 16th, 17th; Cape Lookout, 16th, Smithville, 17th; Brevard, 17th.

South Carolina.—Stateburg, 2d.

Tennessee.—Austin, 1st; Nashville, 2d; Chattanooga, 2d, 3d, 13th, 15th, 16th, 17th; Memphis, 13th, 15th, 16th, 17th.

Texas.—Fort Elliott, 14th; Cleburne, 16th; Barnesville, 27th.

Virginia.—Johnsontown, 13th, 15th, 17th, 29th; Norfolk, 13th, 15th; Marion, 16th.

At Webster, Day county, Dakota, on the 16th, ice was reported to be seven and one-half inches in thickness.

PRECIPITATION.

The distribution of rainfall over the United States and Canada for the month of November, 1883, as determined from reports from more than six hundred stations, is exhibited on chart iv.

The monthly precipitation has been excessive in the Gulf states, Ohio valley, Tennessee, upper lake region, northern slope and northern plateau. In these districts the excesses are not marked, being generally less than 1.00 except in the upper lake region and Ohio valley, where they were 1.00 and 1.05, respectively. In Tennessee the average precipitation was only 0.17 above the normal, and in the other districts of excess, the departures ranged from 0.49 in the eastern Gulf states to 0.90 in the western Gulf states, and 0.96 in the Rio Grande valley. At Salt Lake City, Utah, the monthly precipitation was 0.24 above the average of nine years. In the district bordering on the Atlantic and Pacific coasts, in the lower lake region, extreme northwest, upper Mississippi and Missouri valleys, middle and southern slopes, and in the southern plateau, the monthly precipitation has been below the normal. The deficiencies were large on the Atlantic and Pacific coasts, but in the other districts named they ranged from 0.14 in the upper Mississippi valley to 0.57 in the southern plateau. On the Pacific coast the deficiencies increase from 1.03 in southern California to 1.48 in Oregon and Washington Territory. On the Atlantic coast the largest deficiencies are 2.25 in middle Atlantic states and 2.68 in Florida. On the summit of Mount Washington, New Hampshire, the monthly precipitation was 3.03

below the average, and on the summit of Pike's Peak, Colorado, it was 2.23 below.

The general distribution of rainfall for the month of November, with the districts of maximum departures from the normal in each year from 1873 to 1882, inclusive, are as follows:

Districts.	Maximum departures.	Year.	Remarks
		1873...	Normal in the lower Mississippi valley and eastern Gulf states; deficient in the lake region, upper Mississippi, Missouri, and Ohio valleys; excessive in the west Gulf states, Saint Lawrence valley, and in the districts on the Atlantic coast.
Pacific coast.....	+ 2.88		
Ohio valley.....	+ 1.70		
Western Gulf.....	+ 2.00	1874...	Normal in the Saint Lawrence valley; excessive on the Pacific coast, in the upper lake region, upper Mississippi, Missouri, and Ohio valleys; deficient in Minnesota, the lower lake region, and in the states bordering on the Atlantic and Gulf coasts.
Eastern Gulf.....	+ 1.90		
New England.....	+ 1.10		
Pacific coast.....	+ 5.40		
Ohio valley.....	+ 2.05	1875...	Excessive on the Pacific coast, in New England, the Ohio valley, middle Atlantic and Gulf states; deficient in the south Atlantic states, Minnesota, lake region, and in the upper Mississippi and Missouri valleys.
Eastern Gulf.....	+ 1.45		
Upper Mississippi valley.....	+ 1.30		
Minnesota.....	+ 1.10		
New England.....	+ 1.45		
Middle Atlantic states.....	+ 1.00	1876...	Normal in Minnesota; excessive in New England, the middle Atlantic states, upper lake region, and upper Mississippi valley; deficient in the lower lake region, Saint Lawrence, Ohio, and Missouri valleys, and in the south Atlantic and east Gulf states.
Ohio valley.....	+ 2.00		
Saint Lawrence valley.....	+ 1.25		
Western Gulf.....	+ 1.20		
Portland, Oregon.....	+ 5.50		
Middle Atlantic states.....	+ 2.55	1877...	Deficient in California, Minnesota, and in the upper Missouri valley; excessive in the lower Missouri valley, west Gulf states, and in all districts east of the Mississippi river.
South Atlantic states.....	+ 2.39		
Western Gulf.....	+ 2.03		
California coast.....	+ 1.09		
Upper Missouri valley.....	+ 0.38		
Saint Lawrence valley.....	+ 2.64		
Middle Atlantic states.....	+ 1.29	1878...	Normal in the south Atlantic states; excessive in the Gulf states, New England, lower lake region, and in the Saint Lawrence and Ohio valleys; deficient on the Pacific coast, upper lake region, upper Mississippi and Missouri valleys, and the Middle Atlantic states and Tennessee.
Portland, Oregon.....	+ 2.34		
California coast.....	+ 1.02		
Missouri valley.....	+ 1.01		
Missouri valley.....	+ 3.32		
Upper Mississippi valley.....	+ 2.65	1879...	Deficient in the north Pacific coast region, the upper Missouri valley, Minnesota, and in the states bordering on the Atlantic and Gulf coasts; excessive in California, the lake region, Tennessee, and in the Saint Lawrence, Ohio, upper Mississippi, and lower Missouri valleys.
Upper lakes.....	+ 2.50		
Portland, Oregon.....	+ 3.39		
Middle Atlantic states.....	+ 2.12		
Eastern Gulf.....	+ 2.08		
Western Gulf.....	+ 3.38		
South Atlantic states.....	+ 2.90	1880...	Deficient on the Pacific coast, in the upper lake region, Missouri and Ohio valleys, New England, and the middle Atlantic states; excessive in the Saint Lawrence valley, lower lake region, upper Mississippi valley, Tennessee, and in the south Atlantic and Gulf states.
Tennessee.....	+ 2.34		
North Pacific coast.....	+ 5.33		
Middle Pacific coast.....	+ 2.05		
New England.....	+ 1.85		
Western Gulf.....	+ 3.38		
South Atlantic states.....	+ 2.90	1880...	Deficient on the Pacific coast, in the upper lake region, Missouri and Ohio valleys, New England, and the middle Atlantic states; excessive in the Saint Lawrence valley, lower lake region, upper Mississippi valley, Tennessee, and in the south Atlantic and Gulf states.
Tennessee.....	+ 2.34		
North Pacific coast.....	+ 5.33		
Middle Pacific coast.....	+ 2.05		
New England.....	+ 1.85		
Missouri valley.....	+ 2.56		
Upper lakes.....	+ 1.05	1881...	Deficient on the Pacific coast, in New England, and the middle Atlantic states; normal in Florida; excessive in the Gulf states, Tennessee, lake region, and in the upper Mississippi, Missouri, and Ohio valleys.
Ohio valley.....	+ 1.05		
North Pacific coast.....	+ 1.54		
Middle Atlantic states.....	+ 0.69		
Middle Pacific coast.....	+ 3.13		
Southern slope.....	+ 1.34	1882...	Excessive in the extreme northwest, over the southern districts from the Mississippi river to California, and in Florida; normal in the upper Mississippi and Missouri valleys; deficient in all other districts.
Saint Lawrence valley.....	+ 2.98		
Middle Atlantic states.....	+ 2.41		
North Pacific coast.....	+ 2.38		

In the first column of the following table is given the average rainfall for November in each of the various districts for several years, as determined from observations made at the Signal Service stations; in the second column is given the average for November, 1883, and the third column shows the excess or deficiency of November, 1883, as compared with the average of that month in previous years:

Average precipitation for November, 1883.

Districts.	Average for November, Signal-Service observations.		Comparison of Nov., 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	Inches.	Inches.
New England.....	4.40	2.71	1.69 deficiency.
Middle Atlantic states.....	3.62	1.37	2.25 deficiency.
South Atlantic states.....	3.85	2.36	1.49 deficiency.
Florida peninsula.....	3.30	0.62	2.68 deficiency.
Eastern Gulf.....	4.70	5.25	0.49 excess.
Western Gulf.....	4.66	5.56	0.90 excess.
Rio Grande valley.....	1.55	2.51	0.96 excess.
Tennessee.....	4.64	4.81	0.17 excess.
Ohio valley.....	3.52	4.57	1.05 excess.
Lower lakes.....	3.18	3.02	0.16 deficiency.
Upper lakes.....	2.74	3.74	1.00 excess.
Extreme northwest.....	0.95	0.55	0.42 deficiency.
Upper Mississippi valley.....	2.68	2.54	0.14 deficiency.
Missouri valley.....	1.23	0.68	0.55 deficiency.
Northern slope.....	0.54	1.07	0.53 excess.
Middle slope.....	0.63	0.18	0.45 deficiency.
Southern slope.....	1.11	0.79	0.32 deficiency.
Northern plateau.....	1.98	2.48	0.50 excess.
Southern plateau.....	0.68	0.11	0.57 deficiency.
North Pacific coast.....	6.67	5.19	1.48 deficiency.
Middle Pacific coast.....	2.35	0.98	1.37 deficiency.
South Pacific coast.....	1.13	0.10	1.03 deficiency.
Mount Washington, N. H.....	6.75	3.72	3.03 deficiency.
Pike's Peak, Col.....	2.30	0.07	2.23 deficiency.
Salt Lake City, Utah.....	1.54	1.76	0.24 excess.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average precipitation for November, 1883. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: monthly rainfall, 5.77, is 2.06 above the November average of the last two years.

British Columbia.—New Westminster: the rainfall during November, 1883, was the largest ever known at this place. The total amount was 16.74, or 9.00 above the normal. From 10 a. m. of the 27th to 9 a. m. of the 30th, 10.28 fell.

Illinois.—Riley, McHenry county: monthly rainfall, 4.03, is 2.09 above the November average of the last twenty-three years. The total rainfall for the autumn of 1883 slightly exceeds the autumnal average of the last twenty-two years.

Anna, Union county: monthly rainfall, 6.85, is 2.30 above the November average of the last eight years.

Mattoon, Coles county: monthly rainfall, 4.73, is 0.46 above the November average of the last four years.

Indiana.—Wabash, Wabash county: monthly rainfall, 3.65, is 0.57 above the November average of the last eight years.

Logansport, Cass county: monthly rainfall, 3.45, is 0.58 above the November average of the last twenty-four years. An immeasurable quantity of snow fell on the 15th. The average November snowfall at this place since 1859 is 5.2. The largest November snowfall during the period since 1859 is 18.5 in 1864. No snow fell during November in the following years: 1860, '61, and '83.

Kansas.—Independence, Montgomery county: monthly rainfall, 0.79, is 1.36 below the November average of the last eleven years.

Lawrence, Douglas county: monthly rainfall, 0.79, is 1.36 below the November average of the last sixteen years.

Wellington, Sumner county: monthly rainfall, 0.18, is 1.16 below the November average of the four preceding years.

Maine.—Gardiner, Kennebec county: monthly rainfall, 2.95, is 1.40 below the November average of the last forty-seven years.

Maryland.—Fallston, Harford county: monthly rainfall, 1.79, is 1.90 below the November average of the last thirteen years.

Missouri.—Saint Louis: monthly rainfall, 2.18, is 0.77 below the average for November since 1839.

New Hampshire.—Contoocookville, Merrimack county: monthly rainfall, 1.85, is nearly 1.50 below the November average of the last twelve years.

Table of Excessive, Greatest, and Least Monthly Rainfalls.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
<i>Alabama.</i>					<i>Arizona.</i>	
Green Springs.....	22	2.60			Casa Grande.....	0.00
<i>Georgia.</i>					Fort Thomas.....	0.00
Augusta.....	24, 25	3.13			Fort Verde.....	0.00
Foreyth.....	24, 25	2.40			Maricopa.....	0.00
<i>Illinois.</i>					San Carlos.....	0.00
Anna.....	21	3.51		6.85	Wilcox.....	0.00
Morrison.....	5	4.08		6.30	Pineburg.....	0.00
Chicago.....	5	3.34			Yuma.....	0.00
Riley.....	4, 5	2.16			Tucson.....	0.02
Polo.....	5	2.10			Fort Apache.....	0.02
<i>Indiana.</i>					Pantano.....	0.05
Evansville.....	21	3.64		7.45	Benson.....	0.07
Martinsville.....	21	2.00		7.23	Fort Grant.....	0.11
Mitchell.....	21	2.50			San Simon.....	0.35
Worthington.....	21	3.36			Willcox.....	0.36
Franklin.....	21	4.25			Fort Bowie.....	0.39
Indianapolis.....	20, 21	4.03		.80	Fort Lowell.....	0.48
Terre Haute.....	20, 21	4.11		6.53	<i>California.</i>	
Connersville.....				6.23	Anaheim.....	0.00
Brookville.....	21	2.05		6.15	Colton.....	0.00
Franklin.....	21	4.25			Daguerre.....	0.00
Vevay.....	22	3.85			Delano.....	0.00
Richmond.....	21	3.80			Fenner.....	0.00
Griffin Station.....	20, 21	3.69			Indio.....	0.00
Glenwood.....	21	3.27			Kingsburg.....	0.00
Corydon.....	23	3.20			Lemoore.....	0.00
Marengo.....	21	2.76			Los Angeles.....	0.00
Degonia.....	21	2.75			Mammoth Tank.....	0.00
Spiceland.....	21	2.69			Mojave.....	0.00
Jeffersonville.....	21	2.68			Needles.....	0.00
Wabash.....	20, 21	2.14			Newhall.....	0.00
Blue Lick.....	22	2.13			Oakwood.....	0.00
Huntingburg.....	21	2.11			Stavenna.....	0.00
Hanover.....	21	2.10			San Fernando.....	0.00
Miami.....	21	2.05			Spadra.....	0.00
Fort Wayne.....	21	2.01			White Water.....	0.00
<i>Iowa.</i>					Fresno.....	0.00
Muscatine.....	5	2.58			Caliente.....	0.05
Davenport.....	5	2.03			Summer.....	0.05
<i>Kentucky.</i>					Williams.....	0.05
Louisville.....	21, 22	3.45		6.05	Tulare.....	0.06
<i>Louisiana.</i>					Princeton.....	0.10
New Orleans.....	11	2.42		6.36	Oreland.....	0.12
<i>Maine.</i>					Tebachapi.....	0.14
Portland.....	26, 27	2.65			Willows.....	0.15
<i>Massachusetts.</i>					Keene.....	0.16
Fall River.....	26, 27	2.75			Modesto.....	0.16
Provincetown.....	26, 27	2.37			Solidad.....	0.17
Taunton.....	26, 27	2.10			Chuniar.....	0.18
<i>Michigan.</i>					Borden.....	0.20
Northport.....	5, 6	2.10		7.85	San Diego.....	0.20
Hudson.....	14, 15	2.50			San Mateo.....	0.21
<i>Mississippi.</i>					Callatoga.....	0.24
Vicksburg.....	22	4.02		11.53	Salinas City.....	0.26
<i>Missouri.</i>					Menlo Park.....	0.28
Ironton.....				6.80	San Jose.....	0.28
Saint Louis.....	20, 21	2.52			Tracy.....	0.30
Jefferson Barracks.....	20, 21	2.48			Turlock.....	0.32
<i>North Carolina.</i>					Gilroy.....	0.33
Hatteras.....	25, 26	4.28			Pleasanton.....	0.33
Charlotte.....	25	2.42			Davis.....	0.35
<i>Ohio.</i>					Hollister.....	0.35
Cincinnati.....	21, 22	3.94			Merced.....	0.38
<i>Ontario.</i>					Tennant.....	0.38
Parry Sound.....				6.30	Brighton.....	0.39
<i>Oregon.</i>					Petaluma.....	0.41
Portland.....				5.26	Oakland.....	0.42
<i>Rhode Island.</i>					South Vallejo.....	0.42
Point Judith.....	26, 27	2.71			Dunnigan.....	0.45
<i>South Carolina.</i>					Stockton.....	0.49
Aiken.....	25	3.48			<i>Colorado.</i>	
<i>Tennessee.</i>					Pueblo.....	0.00
Hillham.....				7.12	Pike's Peak.....	0.07
Chattanooga.....	23	3.00	18hr. 45m.	6.79	West Las Animas.....	0.21
Careyville.....				6.01	Denver.....	0.32
Riddleton.....				6.00	<i>Dakota.</i>	
<i>Texas.</i>					Fort Hale.....	0.00
Palestine.....	10, 11	5.38		7.09	Fort Sisseton.....	0.00
<i>Washington.</i>					Fort Snelly.....	0.00
Fort Canby.....				8.34	Fort Yates.....	0.00
					Fort Bennett.....	0.00
					Fort Meade.....	0.05
					Huron.....	0.05
					Alexandria.....	0.06
					Webster.....	0.08
					Yankton.....	0.08
					Fort Buford.....	0.14
					Bismarck.....	0.26
					Fort Lincoln.....	0.30
					<i>Florida.</i>	
					Limona.....	0.00
					Jacksonville.....	0.09
					Saint Augustine.....	0.23
					Sanford.....	0.35
					<i>Georgia.</i>	
					Andersenville.....	0.26
					<i>Iowa.</i>	
					Logan.....	0.10
					<i>Kansas.</i>	
					Allison.....	0.00
					Salina.....	0.04
					Wellington.....	0.18
					Manhattan.....	0.20
					Emporia.....	0.34
					Holton.....	0.37

Table of Excessive, Greatest, and Least Monthly Rainfalls.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
<i>Kansas—Continued.</i>					<i>Kansas—Continued.</i>	
Pretty Prairie.....				0.50	Pretty Prairie.....	0.50
<i>Massachusetts.</i>					<i>Massachusetts.</i>	
Fort Warren.....				0.22	Fort Warren.....	0.22
<i>Minnesota.</i>					<i>Minnesota.</i>	
Moorhead.....				0.16	Moorhead.....	0.16
Saint Vincent.....				0.26	Saint Vincent.....	0.26
<i>Montana.</i>					<i>Montana.</i>	
Fort Keogh.....				0.20	Fort Keogh.....	0.20
Fort Benton.....				0.36	Fort Benton.....	0.36
Fort Shaw.....				0.43	Fort Shaw.....	0.43
<i>Nebraska.</i>					<i>Nebraska.</i>	
Central City.....				0.00	Central City.....	0.00
Genoa.....				0.00	Genoa.....	0.00
Hastings.....				0.00	Hastings.....	0.00
Iravale.....				0.00	Iravale.....	0.00
Marquette.....				0.06	Marquette.....	0.06
Neligh.....				0.00	Neligh.....	0.00
Norfolk.....				0.00	Norfolk.....	0.00
Schuyler.....				0.00	Schuyler.....	0.00
Stockham.....				0.00	Stockham.....	0.00
Stromsburg.....				0.00	Stromsburg.....	0.00
Fairmount.....				0.01	Fairmount.....	0.01
Red Willow.....				0.02	Red Willow.....	0.02
Beaver Creek.....				0.04	Beaver Creek.....	0.04
Fort Niobrara.....				0.04	Fort Niobrara.....	0.04
Crete.....				0.10	Crete.....	0.10
Fremont.....				0.16	Fremont.....	0.16
Mission Creek.....				0.38	Mission Creek.....	0.38
Table Rock.....				0.40	Table Rock.....	0.40
North Platte.....				0.42	North Platte.....	0.42
Ashland.....				0.46	Ashland.....	0.46
Fairbury.....				0.50	Fairbury.....	0.50
Fort Robinson.....				0.50	Fort Robinson.....	0.50
Johnson.....				0.50	Johnson.....	0.50
Pera.....				0.50	Pera.....	0.50
Weeping Water.....				0.50	Weeping Water.....	0.50
<i>Nevada.</i>					<i>Nevada.</i>	
Carlin.....				0.00	Carlin.....	0.00
Hot Springs.....				0.00	Hot Springs.....	0.00
Golconda.....				0.11	Golconda.....	0.11
Carson City.....				0.13	Carson City.....	0.13
Wadsworth.....				0.25	Wadsworth.....	0.25
Brown's.....				0.28	Brown's.....	0.28
Elko.....				0.30	Elko.....	0.30
Tecoma.....				0.38	Tecoma.....	0.38
Boca.....				0.50	Boca.....	0.50
<i>New Mexico.</i>					<i>New Mexico.</i>	
Fort Wingate.....				0.00	Fort Wingate.....	0.00
Deming.....				0.30	Deming.....	0.30
<i>North Carolina.</i>					<i>North Carolina.</i>	
Smithville.....				0.35	Smithville.....	0.35
<i>Texas.</i>					<i>Texas.</i>	
Barnesville.....				0.02	Barnesville.....	0.02
Fort Elliott.....				0.04	Fort Elliott.....	0.04
Fort Concho.....				0.29	Fort Concho.....	0.29
El Paso.....				0.30	El Paso.....	0.30
<i>Utah.</i>					<i>Utah.</i>	
Kelton.....				0.41	Kelton.....	0.41
Terrace.....				0.45	Terrace.....	0.45
<i>Wyoming.</i>					<i>Wyoming.</i>	
Cheyenne.....				0.16	Cheyenne.....	0.16

Grafton, Grafton county: monthly rainfall, 2.81, is 0.12 below the November average of the last five years.

New York.—Palermo, Oswego county: monthly rainfall, 3.57, is 0.30 below the November average of the last thirty years.

North Volney, Oswego county: monthly rainfall, 4.00, is 0.29 above the November average of the last twelve years. The total rainfall for the autumn of 1883 is 8.90, or 1.28 below the autumnal average of the last twelve years.

Ohio.—Wauseon, Fulton county: monthly rainfall, 2.88, is 0.39 below the November average of the last eleven years. The largest November precipitation of that period, 5.83, occurred in 1881; the smallest, 1.87, occurred in 1872.

Pennsylvania.—Dyberry, Wayne county: monthly rainfall, 2.27, is 0.52 below the average of the last twelve years.

Texas.—New Ulm, Austin county: monthly rainfall, 5.32, is 0.80 below the November average of the last twelve years.

The largest November rainfall of that period, 14.93, occurred in 1873; the smallest, 0.78, occurred in 1879.

Virginia.—Variety Mills, Nelson county: monthly rainfall, 1.05, is 1.21 below the November average of the last five years.

Wytheville, Wythe county: monthly rainfall, 2.54, is 0.15 below the November normal.

West Virginia.—Helvetia, Randolph county: monthly rainfall, 2.05, is 2.26 below the November average of the last seven years.

HAIL.

Hail has been reported from the several states and territories as follows:

Arizona.—Prescott, 9th.
Illinois.—Mattoon, 24th; Larchland, 25th.
Indiana.—Wabash, 8th; Indianapolis, 9th.
Iowa.—Indianola, 8th, 25th.
Kansas.—Clay Centre, 4th, 5th; Emporia and Leavenworth, 5th.
Maine.—Bangor 1st; Gardiner, 1st, 12th.
Massachusetts.—Somerset and Westborough, 2d.
Michigan.—Northport, 4th and 11th; Escanaba, 10th, 11th; Traverse City, 26th.
Missouri.—Saint Louis, 21st.
Nebraska.—Johnson, 5th.
New Jersey.—Cape May, 2d.
New York.—Fort Niagara, 1st; Menand station, (near Albany) 3d; Ardenia, 9th; Palermo, 9th, 11th.
Ohio.—Sandusky, 9th.
Oregon.—Portland, 18th; Astoria, 24th, 25th; Fort Stevens, 24th.
Rhode Island.—Point Judith, 2d.
Utah.—Logan, 23d.
Wisconsin.—Beloit and Manitowac, 25th. At Sussex, Waukesha county, a thunder-storm, accompanied by hail and high wind, occurred on the 26th, beginning at 12.20 a. m., and lasting twenty minutes.

SNOW.

Snow fell in the several districts during the month as follows:

New England.—2d, 12th, 14th to 17th, 29th, 30th. On the summit of Mount Washington, New Hampshire, snow fell on 1st, 12th to 16th, 18th, 19th, 23d, 24th, 26th to 30th.
Middle Atlantic states.—1st, 2d, 12th, 14th, 15th, 16th, 25th, 27th, 28th, 30th.
Ohio valley.—1st, 2d, 12th to 16th.
Lower lakes.—1st, 2d, 12th to 16th, 25th, 27th, 28th, 30th.
Upper lakes.—1st, 2d, 6th, 11th to 16th, 21st to 30th.
Extreme northwest.—9th, 10th, 11th, 13th, 14th, 18th to 30th.
Upper Mississippi valley.—5th, 11th, 13th, 14th, 21st, 24th to 27th.
Missouri valley.—5th, 9th, 13th, 19th to 23d, 25th.
Northern slope.—2d, 4th, 8th to 13th, 18th to 30th.
Middle plateau.—3d, 4th, 5th, 8th, 9th, 19th to 22d, 24th, 25th.
Northern plateau.—6th, 19th, 20th, 21st, 24th, 25th, 26th.
North Pacific coast.—6th, 8th, 21st, 22d, 24th, 25th, 26th.
 On the summit of Pike's Peak, Colorado, snow fell on the 3d, 9th, 20th, 21st, 23d, 25th; and at Denver, Colorado, on the 13th and 25th.
 A slight fall of snow occurred at Auburn, Alabama, at 9.30 a. m. of the 15th.

LARGEST MONTHLY SNOWFALLS.

[Expressed in inches.]

The following are the largest monthly snowfalls reported from the various states and territories during the month:

California.—Cisco, 22; Emigrant Gap, 12; Summit, 12.
Dakota.—Fort Assiniboine, 31.1; Fort Buford, 17.5; Fort Totten, 7.3.
Massachusetts.—Rowe, 7.
Michigan.—Northport, 15.55; Marquette, 15.2; Fort Brady, about 15; Alpena, 12.3; Traverse City, 11; Grand Rapids, 8.5; Grand Haven, about 6.
Minnesota.—Duluth, about 11.
Montana.—Fort Ellis, 8.8; Fort Shaw, 8.3; Helena, 6.4.
Nevada.—Truckee, 25; Otega, 17; Wells, 13; Toano, 8.5; Battle Mountain, 7; Halleck, 6.5.
New Brunswick.—Fredericton, 6.3.
New Hampshire.—Mount Washington, about 8.

New York.—Humphrey, 19.5; Kiantone, 9.25; North Volney, about 8; Palermo, 5.25; Johnstown, 5; Buffalo, about 5; Oswego, about 5.

Nova Scotia.—Halifax, 8.5.

Ohio.—Wauseon, 8.

Pennsylvania.—Grampian Hills, 9.

Prince Edward Island.—Charlottetown, 5.6.

Utah.—Promontory, 10.5; Ogden, 10; Salt Lake City, about 10; Nephi, 8.1; Blue Creek, 7.5; Logan, 7; Corinne, 6.

Vermont.—Stratford, 9; Lunenburg, 7.5; Newport, 7.25.

Washington Territory.—Spokane Falls, about 9.

Wyoming.—Fort Bridger, 7.6.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches.]

Dakota.—Fort Buford, 5; Bismarck, 1.
Massachusetts.—Rowe, 3.
Michigan.—Mackinaw City, 3; Marquette, 3; Traverse City, 2.5; Alpena, 2; Escanaba, 2.
Minnesota.—Saint Vincent, 2; Duluth, 1.
Montana.—Poplar River, 6; Fort Maginnis, 2.
New Hampshire.—Mount Washington, 2.
Utah.—Logan, 2.
Vermont.—Lunenburg, 5; Newport, 4; Strafford, 3; Woodstock, 2.

SNOW FROM A CLOUDLESS SKY.

Pittsburg, Pennsylvania.—Snow fell from a cloudless sky at 5 p. m. of the 15th.

SLEET.

Northfield, Minnesota, 1st, 2d.
 Mount Washington, New Hampshire, 1st, 12th to 16th, 18th, 19th, 23d, 24th, 26th to 30th.
 Oswego, New York, 1st, 12th.
 Block Island, Rhode Island, 2d.
 Erie, Pennsylvania, 2d.
 Baltimore, Maryland, 2d.
 Cheyenne, Wyoming, 4th.
 Salt Lake City, Utah, 9th.
 Escanaba, Michigan, 10th.
 Eastport, Maine, 12th, 30th.
 Montgomery, Alabama, 15th.
 Dayton, Washington Territory, 19th.
 Cedar Rapids, Iowa, 21st.
 Dubuque, Iowa, 21st.
 Fort Stevens, Oregon, 24th, 25th.
 Fort Canby, Washington Territory, 24th, 25th.
 Duluth, Minnesota, 25th.
 Moorhead, Minnesota, 29th.
 Port Huron, Michigan, 30th.

Table of rainy and cloudy days, relative humidity, and dew-point for Nov., 1883.

Districts.	Rainy days.	Cloudy days.	Rel. humidity. °	Dew-point.
			Percentages.	°
New England.....	From 9 to 19	From 4 to 11	From 69.4 to 78.8	From 31.2 to 39.6
Middle Atlantic states.....	4 " 17	3 " 13	60.7 " 75.9	32.7 " 43.2
South Atlantic states.....	4 " 11	3 " 8	62.6 " 78.8	38.2 " 51.0
Florida peninsula.....	5 " 9	1 " 6	77.1 " 79.6	57.8 " 68.1
East Gulf.....	9 " 13	5 " 8	67.3 " 69.9	45.3 " 51.7
West Gulf.....	8 " 18	7 " 10	62.0 " 79.6	40.0 " 59.2
Rio Grande valley.....	7 " 13	Nine	71.9 " 81.3	57.5 " 62.4
Ohio valley.....	13 " 21	6 to 10	62.3 " 69.3	31.9 " 38.4
Tennessee.....	10 " 16	7 " 9	66.4 " 73.9	39.3 " 42.9
Lower lakes.....	13 " 22	10 " 19	62.8 " 72.1	31.1 " 34.9
Upper lakes.....	9 " 21	7 " 18	66.2 " 80.5	22.4 " 34.3
Extreme northwest.....	5 " 12	4 " 8	75.8 " 81.0	12.3 " 20.4
Upper Mississippi valley.....	4 " 14	4 " 9	60.2 " 70.6	31.5 " 39.3
Missouri valley.....	0 " 0	1 " 4	62.2 " 68.1	17.6 " 30.7
Northern slope.....	2 " 14	1 " 11	41.9 " 66.9	6.4 " 22.2
Middle slope.....	1 " 4	0 " 2	46.3 " 55.2	16.1 " 25.1
Southern slope.....	Six	Seven	63.7 " 67.5	6.4 " 24.4
Southern plateau.....	0 " 5	0 " 3	49.1 " 55.0	23.1 " 31.3
Northern plateau.....	4 " 18	7 " 16	69.1 " 78.7	32.3 " 34.1
North Pacific.....	16 " 25	15 " 20	82.2 " 90.8	40.1 " 44.6
Middle Pacific.....	2 " 3	2 " 6	69.8 " 80.3	39.8 " 47.2
South Pacific.....	0 " 2	1 " 2	59.5 " 64.8	41.9 " 45.1
Mt. Washington, N. H.....	Eighteen	Two	88.0	16.5
Pike's Peak, Col.	Six	None	75.4	7.3

* Relative humidity corrected for altitude.

WINDS.

The most frequent directions of the wind during November, 1883, at the Signal Service stations are shown on chart iii. by arrows flying with the wind. In the upper Mississippi and lower Missouri valleys, lake region, Ohio valley, and on the Atlantic coast north of Virginia, the prevailing winds were from south to southwest; on the south Atlantic and Gulf coasts they were northerly; in the upper Missouri valley they were northwesterly; in Montana westerly; on the Pacific coast variable.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	12,191	New Haven, Conn.....	5,677
Middle Atlantic states.....	Cape May, N. J.....	13,134	Lynchburg, Va.....	2,556
South Atlantic states.....	Fort Macon, N. C.....	10,123	Augusta, Ga.....	2,376
Florida peninsula.....	Key West.....	8,629	Cedar Keys.....	5,757
East Gulf.....	New Orleans.....	5,974	Montgomery, Ala.....	3,437
West Gulf.....	Indianola, Tex.....	10,359	Little Rock, Ark.....	3,679
Ohio valley.....	Louisville, Ky.....	6,123	Indianapolis, Ind.....	4,277
Tennessee.....	Nashville.....	4,708	Chattanooga.....	4,006
Lower lakes.....	Sandusky, Ohio.....	11,388	Toledo, Ohio.....	7,789
Upper lakes.....	Grand Haven, Mich.....	11,776	Duluth, Minn.....	6,116
Extreme northwest.....	Moorhead, Minn.....	8,621	Bismarck, Dak.....	6,171
Upper Mississippi valley.....	Saint Louis, Mo.....	9,459	Dubuque, Ia.....	4,646
Missouri valley.....	Huron, Dak.....	7,329	Fort Bennett, Dak.....	4,325
Northern slope.....	Fort Maginnis, Mont.....	9,944	Helena, Mont.....	3,311
Middle slope.....	Fort Elliott, Texas.....	7,420	West Las Animas, Colo.....	4,507
Southern slope.....	Fort Concho, Tex.....	6,198	Fort Stockton, Tex.....	2,825
Southern plateau.....	Fort Grant, Ariz.....	4,859	El Paso, Tex.....	2,736
Northern plateau.....	Dayton, Wash.....	4,789	Lewiston, Idaho.....	2,089
North Pacific.....	Fort Canby, Wash.....	8,659	Roseburg, Oreg.....	1,459
Middle Pacific.....	San Francisco, Cal.....	4,459	Sacramento, Cal.....	3,126
South Pacific.....	Los Angeles, Cal.....	3,986	San Diego, Cal.....	3,526

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements were 25,950 and 17,062 miles, respectively, the record at the former station being incorrect on account of frost-work on the recording instrument. At Salt Lake City, Utah, the only Signal Service station in the Middle plateau, the total movement of the air was 3,165 miles.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, velocities of fifty miles or more per hour occurred on the following dates: 3d to 7th, 9th, 10th, 11th, 13th, 14th, 16th, 17th, 18th, 20th to 30th. The highest velocities recorded were: 100, n.w., 12th; 100, w., 22d and 100, s.e., 26th (maximum for month); 90, n.w., 17th; 84, n.w., 27th; 80, n.w., 9th, 10th, 13th and 28th.

On the summit of Pike's Peak, Colorado, velocities of fifty miles or more per hour occurred on the 6th, 7th, 8th, 17th to 26th. The highest velocities recorded were: 84, w., 24th and 81, w., 25th.

Other stations reporting wind-velocities of fifty miles or more per hour are as follows:

Cape May, New Jersey, 72, w., 12th; 52, s.w., 14th, 15th, 16th.

Sandy Hook, New Jersey, 68, n.w., 12th.

* Kitty Hawk, North Carolina, 63, n.e., 27th.

Barnegat City, New Jersey, 60, n.w., 12th.

Fort Canby, Washington Territory, 60, s., 26th.

Rochester, New York, 55, s., 26th.

Sandusky, Ohio, 55, n.w., 11th.

Delaware Breakwater, Delaware, 54, n.w., 12th.

Block Island, Rhode Island, 54, n.w., 12th.

Saint Louis, Missouri, 53, s., 5th.

Buffalo, New York, 53, w., 11th, 12th, 13th; 52, s.w., 14th.

Grand Haven, Michigan, 52, w., 11th.

Fort Macon, North Carolina, 52, n., 27th.

Milwaukee, Wisconsin, 51, n.w., 11th.

Fort Assinniboine, Montana, 50, s.w., 6th.

* Highest velocity recorded; self-register out of order.

LOCAL STORMS.

Springfield, Missouri.—On the afternoon of the 5th a very violent and destructive tornado passed over Green county in a direction from west-southwest to east-northeast. It first appeared in the vicinity of the village of Republic (about twelve miles southwest of this city) its path being about one mile north of that place. Many dwellings and other buildings were destroyed in this vicinity, and several persons were seriously injured. At Brookline station, about eight miles southwest of Springfield, numerous dwellings were destroyed, one person was killed and several were injured. A school-house, about three miles west of Springfield, was totally destroyed. The tornado struck Springfield at a few minutes after 2 p. m., and passed in an easterly direction between North Springfield and the former place. Many substantial buildings were destroyed in its path. In Springfield and vicinity six persons were killed and about thirty were more or less seriously injured. At Bridgetown, just east of North Springfield, about thirty small houses were demolished and several persons were injured. The path of the tornado increased from one hundred yards in width at Springfield to about three hundred yards at Bridgetown. Estimates of the value of the property destroyed by this storm vary from \$150,000 to \$200,000.

Buffalo, New York.—During a gale on the afternoon of the 9th a building in course of construction at this place was blown down, killing four workmen and injuring several others.

Hector, Schuyler county, New York.—A tornado occurred in this county on the afternoon of the 9th. It began its course near Reading and passed eastward for a distance of fifteen miles, its path varying in width from eight to twelve rods. Numerous farm buildings were wrecked, trees uprooted and fencing blown down.

Washington, Saint Landry parish, Louisiana.—A whirlwind struck Oakland plantation, about one mile from this place, on the night of 10-11th, which blew down several houses.

Oswego, New York.—At 11.30 p. m. of the 11th a tornado occurred about one and one-half miles north of Cleveland, Oswego county. Several buildings were unroofed and many trees were blown down. The tornado was of very short duration, and was attended during its passage by a loud roaring sound.

Portland, Maine.—The storm of the 13th was very destructive in Piscataquis county. North of Williamsburg and on the west branch of the Piscataquis river, many acres of timber were blown down. The damage to timber in the vicinity of the Katahdin Iron Works is estimated at \$50,000. Reports from northern Penobscot and southern Aroostock counties state that a large amount of damage was done to the timber lands in those sections.

Orono, Penobscot county, Maine.—The storm of the 12th caused great damage to the forests in the northern part of this state.

Batesville, Independence county, Arkansas.—On the 21st a tornado nearly destroyed the village of La Crosse, Izard county, where three persons were killed and several injured. The tornado lasted but a few minutes, coming from the southwest and passing into Oregon county, Missouri. The damage resulting from this storm is estimated at \$100,000.

Vincennes, Knox county, Indiana.—A violent storm occurred at this place on the 21st, which blew down about twenty-five out-buildings in the suburbs of the city. Very heavy rain accompanied the storm. Cellars were suddenly flooded by the gorging of the creek at the railroad trestle north of the town. The path of the storm was only about fifty feet in width. Four miles east of this place a number of buildings were blown down.

Cairo, Illinois.—Trains were delayed on the Saint Louis, Iron Mountain and Southern railroad, owing to wash-outs and other damage caused by the storm of the 21st. At about 7 a. m. a tornado passed within one mile of Bertrand, Mississippi county, Missouri, destroying several dwellings and causing loss of life.

Jeffersonville, Clark county, Indiana.—On the night of

the 21st a violent southwesterly storm passed over this city and vicinity, blowing down buildings, trees, signs, &c. This storm was accompanied by unusually heavy rainfall.

North Vernon, Jennings county, Indiana.—Between 7 and 8 p. m. of the 21st, a destructive storm visited this place, which caused considerable loss of property. It passed in a northeasterly direction through the western part of this county, destroying nearly everything in its path. Several residences and barns were destroyed and other property damaged.

Fort Smith, Arkansas.—At 11.30 a. m., of the 21st, a destructive storm swept over this station. The wind, for five minutes, blew at the rate of fifty miles per hour, and caused considerable damage in this vicinity. Several buildings were damaged, and many trees and much fencing were blown down.

Louisville, Kentucky.—A severe storm occurred here on the morning of the 21st. The wind reached a velocity of thirty-six miles per hour, blowing down a number of trees, chimneys, and signs.

Shreveport, Louisiana.—A very heavy rain-storm, lasting about two hours and accompanied by some hail, occurred here on the afternoon of the 21st. The streets were filled with water and many stores in the lower part of the city were submerged. During the storm it was almost as dark as night.

Natchitoches, Natchitoches parish, Louisiana.—A violent storm struck this parish near Cloutierville on the night of the 21st. A large amount of lint and seed cotton was lost and other damage caused.

Carmi, White county, Illinois.—A tornado visited the village of Sacramento, in this county, on the 22d, destroying several buildings. This is the second tornado that has occurred here within the last sixteen months, and about thirteen years ago the village was entirely destroyed.

Prairie du Chien, Crawford county, Wisconsin.—At 9 p. m. of the 25th, a tornado passed over this county in a direction from southwest to northeast. It first struck this county at Bridgeport, where several buildings were destroyed and one person was killed. Everything in the path of the tornado was destroyed; trees two feet in diameter were twisted off. The noise of the tornado was plainly heard at this place.

Portsmouth, North Carolina.—A violent northwesterly storm occurred here at 4.30 a. m. of the 27th, the wind reaching an estimated velocity of seventy miles per hour. Much damage was done to the coast telegraph line.

Kitty Hawk, North Carolina.—On the 29th the schooner "Annie Carll" was blown ashore on Nag's Head beach, eight miles south of this place.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The water in the Mississippi river averaged considerably higher than for October. The changes in the upper Mississippi were very slight, but between New Orleans, Louisiana, and Cairo, Illinois, the highest points reached ranged from three feet and three inches, higher, at the former station, to sixteen feet and eight inches, higher, at the latter, where, on the 30th, when at its highest state, it was about twelve feet below the danger-line. At Saint Louis, Missouri, and Davenport, Iowa, the highest stages occurred on the 11th; at Keokuk, Iowa, from the 7th to 12th; at La Crosse, Wisconsin, on the 19th; at Saint Paul, Minnesota, Dubuque, Iowa, and at stations below Cairo, Illinois, the highest stages occurred at, or near, the close of the month. At Saint Paul, Minnesota, river observations were interrupted by ice from the 15th to 23d, and from the 28th to 30th.

The Ohio and Missouri rivers continued low during November, the former reaching a slightly higher point than during October; and the latter averaging slightly lower. At Yankton, Dakota, the Missouri river was frozen on the 15th and 16th.

Navigation in the Tennessee river, which had been suspended on account of low water since July 1st, was resumed

November 23d; the river having risen about four feet on that date. The highest stage occurred on the 25th, when it was ten feet and eleven inches above low water-mark, and four feet and ten inches higher than the highest point reached during October.

The greatest range in any of the rivers occurred in the Mississippi, between Vicksburg and Cairo, where it varied from twelve feet and three inches at the former station, to fourteen feet and nine inches at the latter.

In the following table are shown the danger points at various river stations; the highest and lowest stages for November, 1883, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, November, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>	<i>Pt. In.</i>		<i>Pt. In.</i>		<i>Pt. In.</i>	<i>Pt. In.</i>
Shreveport, Louisiana.....	29 9					
<i>Arkansas:</i>						
Little Rock, Arkansas.....	30 0	24	10 6	22	4 11	5 7
Fort Smith, Arkansas.....	20	20	2 0	1	1 8	0 2
<i>Missouri:</i>						
Yankton, Dakota *.....	20 0	17	3 7	29, 30	0 9	2 10
Omaha, Nebraska.....	16 0	1 to 7	5 2	30	3 0	2 2
Leavenworth, Kansas.....	21 0	1	7 6	30	5 2	2 4
<i>Mississippi:</i>						
Saint Paul, Minnesota †.....	14 6	27	3 1	11	1 11	1 2
La Crosse, Wisconsin.....	15 0	19	4 4	30	1 0	3 4
Dubuque, Iowa.....	21 10	27	5 0	20	2 8	2 4
Davenport, Iowa.....	15 0	11	4 2	19	1 11	2 3
Keokuk, Iowa.....	14 6	7, 12	5 1	20, 21	2 8	2 0
Saint Louis, Missouri.....	30 0	11	14 6	6, 7, 21	10 1	4 5
Cairo, Illinois.....	40 0	30	28 2	1	13 5	14 9
Memphis, Tennessee.....	34 0	30	20 7	1	7 2	13 5
Vicksburg, Mississippi.....	41 0	23, 30	23 1	3, 4	10 10	12 3
New Orleans, Louisiana ‡.....	—2 6	27	—8 11	4	—13 0	4 1
<i>Ohio:</i>						
Pittsburg, Pennsylvania.....	20 0	1	8 1	31	3 10	5 1
Cincinnati, Ohio.....	50 0	23	20 8	9	11 11	8 9
Louisville, Kentucky.....	24 0	23	10 3	10	6 7	3 8
<i>Chattanooga:</i>						
Nashville, Tennessee.....	42 0	28	16 8	8	4 7	12 1
<i>Tennessee:</i>						
Chattanooga, Tennessee.....	33 0	25	10 11	10	1 4	9 7
<i>Monongahela:</i>						
Pittsburg, Pennsylvania.....	29 0	1	8 1	21	3 0	5 1
<i>Savannah:</i>						
Augusta, Georgia.....	26	13 4	18, 19	4 5	8 11	
<i>Willamette:</i>						
Portland, Oregon.....	28	8 8	10	0 10	7 10	
<i>Sacramento:</i>						
Red Bluff, California.....	9	1 6	3	0 9	0 0	
Sacramento, California.....	11	7 11	23	7 3	0 8	
<i>Mobile:</i>						
Mobile, Alabama.....	21	16 9	16	12 8	4 1	
<i>Colorado:</i>						
Yuma, Arizona.....						

* Frozen 15th and 16th. † Below high-water marks of 1874 and 1883. ‡ Observations interrupted by ice; see text.

CLOSING OF NAVIGATION.

Duluth, Minnesota.—Navigation for this season was practically closed on the 30th.

Moorhead, Minnesota.—Navigation in the Red river at this place was closed on the 15th.

Fort Totten, Dakota.—Navigation on Devil's lake closed on the 11th.

Dubuque, Iowa.—All boats at this place went into winter quarters on the 23d.

Saint Paul, Minnesota.—The last boat of the season left this place for Saint Louis, Missouri, on the 11th.

Fort Sully, Dakota.—Navigation in the Missouri river at this place was closed on the 26th.

Fort Benton Montana.—The Missouri river was closed to navigation here on the 25th.

Menand station (near Albany), New York.—The Erie canal was closed to navigation on the 30th.

The following data relating to the Hudson river at Albany, New York, are taken from "The Argus" of December 3, 1883:

The winter of 1873-'4 was an exceptionally warm one, during which the river was closed but thirty-one days, and it is stated that navigation might have been kept up throughout the entire winter. The succeeding winter (1874-'5) was a very severe one, the river being closed one hundred and twenty days, which is the longest period that it has remained closed at any time since the winter of 1823-'4. The winter of 1835-'6 was also one of great

cold, the Hudson river being locked in by ice for a period of one hundred and twenty-five days. Since 1790, the river was closed ten times during the month of November, as follows:

Year.	Date of closing.	Year.	Date of closing.
1796.....	November 28th	1835.....	November 30th
1797.....	" 26th	1838.....	" 25th
1798.....	" 23d	1842.....	" 29th
1820.....	" 13th	1871.....	" 30th
1827.....	" 25th	1880.....	" 25th

ICE IN RIVERS AND HARBORS.

Penobscot river.—Bangor, Maine: the river froze over at this place on the 29th.

Buffalo river.—Buffalo, New York: the first ice of the season in the river, at this place, appeared on the 16th.

Maumee river.—Toledo, Ohio: the river was covered with a thin film of ice on the 16th.

Grand river.—Grand Haven, Michigan: the first ice of this season in the Grand river formed on the 16th.

Lake Superior.—Marquette, Michigan: the schooner "Reuben Dowd" and all the tugs went into winter quarters on the 30th.

Duluth, Minnesota: Lake Superior was free from ice at this place on the 30th.

Saint Louis and Duluth bays.—Duluth, Minnesota: on the 16th Duluth bay was partly frozen over; boats experienced difficulty in forcing passage. On the 16th the ice on Saint Louis and Duluth bays was sufficiently strong to bear up the weight of persons. On the 17th the ice was reported to be six inches thick. Both the bays were frozen over on the 30th, and teams were crossing on the ice.

Mississippi river.—Dubuque, Iowa: thin ice formed along the shores on the 14th; floating ice on the 15th, 16th, 17th, 29th.

Saint Paul, Minnesota: floating ice 14th, 26th; on the 15th the ice formed a dam in the river; on the 25th the ice-dam moved out, leaving the river clear; another ice-dam formed on the 28th.

Other stations on the Mississippi river report floating ice as follows: Burlington, Iowa, 15th, 16th; Keokuk, Iowa, 16th to 19th; La Crosse, Wisconsin, 14th, 15th; Davenport, Iowa, 14th to 18th; Muscatine, Iowa, 15th.

Milwaukee river.—Milwaukee, Wisconsin: the river froze over at this place on the 16th.

Missouri river.—Fort Sully, Dakota: navigation was interrupted by floating ice on the 14th; river froze over on the 26th.

Yankton, Dakota: the river was blocked with ice on the 17th.

Other stations report floating ice as follows: Fort Bennett, Dakota, 12th, 14th, 15th; Omaha, Nebraska, 14th, 27th; Leavenworth, Kansas, 17th, 18th, 19th.

At Fort Benton, Montana, the river froze over on the 25th.

Red river (of the north).—Saint Vincent, Minnesota: the river froze over at this place on the 11th.

FLOODS.

Saint Louis, Missouri.—A severe rain storm prevailed throughout the state on the 21st, causing great damage to all kinds of property. It was especially severe in the southeastern part of the state. At Fredericktown, Madison county, a creek that runs through the town rose so rapidly as to sweep away several houses. At Piedmont, Wayne county, all but two of the houses in the place were washed away, and several persons were drowned. All of the streams in that vicinity overflowed, causing much damage to crops and farming property. The creeks in Wayne and Reynolds counties were higher than ever before known. The heavy rain storm of this date also extended over the greater part of southern Illinois. The streams in the vicinity of Mount Vernon, Jefferson county, overflowed, greatly damaging the crops in the low-lands. Trains on the Louisville and Nashville Air Line roads were delayed on account of wash-outs. In the vicinity of Duquoin, Perry county, a large area

was overflowed, and many bridges were washed away. Eleven coal mines near Belleville, Saint Clair county, were flooded, throwing about one hundred men out of employment, and causing damage estimated at \$500,000.

Indianapolis, Indiana.—The heavy rains of the 21st and 22d caused great damage in the southern part of this state. In the lower part of Knox county, near the confluence of the Wabash and White rivers, much farming land was overflowed, and heavy losses were sustained by the farmers in that region. Many bridges in the central part of the state were washed away, causing serious interruption to railroad travel. In the southern part of the state a large number of sheep and cattle were drowned, and numerous houses washed away. At noon, of the 23d, the White river, at Indianapolis, was within two feet of the high-water mark of February, 1883. On this date the low grounds in Indianola, on the west side of the river, were covered with water. On the 24th the White river overflowed its banks, flooding residences, elevators, and factories opposite this city.

Vincennes, Knox county, Indiana.—On the morning of the 21st the large dam of the Spring Lake Ice Company, a short distance from this city, broke, sending a volume of water through the town. Many houses were flooded and much damage done.

Bedford, Lawrence county, Indiana, 23d.—The recent very heavy rains caused great damage in the northern part of this county, and also in Monroe county, lying northward. The greatest damage was done about twelve miles north of Bedford, where about one mile of the Louisville, New Albany and Chicago railroad track was washed from the road-bed, and about ten miles of the road were badly damaged. Very heavy losses in stock, ungathered corn, and other property, were sustained.

Terre Haute, Indiana, 23d.—Portions of this city were submerged by the recent heavy rains. Wash-outs occurred on nearly all the railroads centring here, causing suspension of travel. The most serious damage was that caused by the overflow of the Wabash river, and the consequent submerging of thousands of acres of corn land.

HIGH TIDES.

Eastport, Maine, 15th.—The highest tides observed for several years occurred on this date. The tides were also very high on the 16th.

Block Island, Rhode Island.—Very high tides were caused by the high easterly wind on the 26th. At 7 p. m. the tide ran into Harbor pond, two hundred feet from the mean high-tide mark.

Hatteras, North Carolina.—Very high tide in the sound on the 27th.

Sloop Point, North Carolina.—High tides 30th.

LOW TIDES.

Block Island, Rhode Island.—Low tides occurred here on the 12th, 13th, and 26th. On the 13th the tide was lower than has been observed since the establishment of the United States Coast Survey tide-gauge at this place.

Low tides were also reported from New Haven, Connecticut, and Narragansett Pier, Rhode Island, on the 12th, and at Cedar Keys, Florida, on the 17th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for November, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 86.22 per cent. The percentages for the four elements are: weather, 88.31; direction of the wind, 81.54; temperature, 88.04; barometer, 86.92 per cent. By geographical districts they are: For New England, 81.17; middle Atlantic states, 89.96; south Atlantic states, 88.00; eastern Gulf,

88.22; western Gulf, 87.72; lower lakes, 87.22; upper lakes, 86.30; Ohio valley and Tennessee, 89.69; upper Mississippi valley, 82.44; Missouri valley, 72.80; north Pacific, 92.00; middle Pacific, 81.03; south Pacific, 96.30.

There were one hundred and thirty-seven omissions to predict out of 3,690, or 3.71 per cent. Of the 3,553 predictions that have been made, one hundred and eighteen, or 3.32 per cent., are considered to have entirely failed; one hundred and thirteen, or 3.18 per cent., were one-fourth verified; four hundred and thirty-five, or 12.24 per cent. were one-half verified; two hundred and seventy-seven, or 7.80 per cent., were three-fourths verified; 2,610, or 73.46 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During November, 1883, two hundred and forty-one cautionary signals were displayed. Of these, two hundred and three, or 84.2 per cent., were justified by winds of twenty-five miles, or more, per hour, at or within one hundred miles of the station. Fifty-two cautionary off-shore signals were displayed, all of which were justified as to velocity, and fifty or 96.2 were justified both as to direction and velocity. There were no "north-west" signals ordered on the lakes during the month. Two hundred and ninety-three signals of all kinds were displayed, of which two hundred and fifty-three, or 86.4 per cent., were fully justified. These do not include signals ordered at display stations where the velocity is only estimated. Twenty-one signals were ordered late.

Forty winds of twenty-five miles, or more, per hour were reported, for which no signals were ordered.

TEMPERATURE OF WATER.

Temperature of Water for November, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey.....	55.6	41.6	14.0	7 4	45.9
Alpena, Michigan.....	41.6	31.0	10.6	11 10	33.6
Augusta, Georgia.....	67.5	53.0	14.5	5 8	57.4
Baltimore, Maryland.....	57.0	45.0	12.0	9 0	48.2
Block Island, Rhode Island.....	53.1	43.2	9.9	6 5	46.0
Boston, Massachusetts.....	49.6	40.0	9.6	22 2	42.5
Buffalo, New York.....	49.6	35.0	14.6	10 2	43.5
Cedar Keys, Florida.....	79.9	55.9	24.0	11 8	65.8
Charleston, South Carolina.....	68.3	55.9	12.4	41 6	59.4
Chicago, Illinois.....	48.3	34.3	14.0	8 1	41.5
Chincoteague, Virginia.....	60.0	43.2	16.8	5 5	49.1
Cleveland, Ohio.....	50.0	37.6	12.4	14 0	43.0
Detroit, Michigan.....	47.0	30.0	17.0	21 11	43.8
Delaware Breakwater, Delaware.....	56.0	45.3	10.7	8 10	48.3
Duluth, Minnesota.....	45.7	35.3	10.4	15 7	29.7
Eastport, Maine.....	47.7	44.2	3.5	15 11	38.8
Escanaba, Michigan.....	45.8	34.5	11.3	15 4	32.6
Fort Macon, North Carolina.....	66.5	51.0	15.5	3 7	55.6
Galveston, Texas.....	74.0	52.3	21.7	11 0	65.0
Grand Haven, Michigan.....	46.8	32.3	14.5	19 0	40.8
Indianola, Texas.....	77.1	53.8	23.3	8 6	66.3
Jacksonville, Florida.....	74.8	62.0	12.8	18 0	63.3
Key West, Florida.....	86.4	73.8	12.6	17 7	75.0
Mackinaw City, Michigan.....	47.6	31.8	15.8	10 0	35.6
Marquette, Michigan.....	42.7	35.0	7.7	9 10	32.4
Milwaukee, Wisconsin.....	46.5	34.0	12.5	8 0	38.3
Mobile, Alabama.....	71.0	58.0	13.0	14 9	60.5
New Haven, Connecticut.....	50.9	39.5	11.4	13 9	42.1
New London, Connecticut.....					
New York City.....	53.5	44.7	8.8	16 4	45.0
Norfolk, Virginia.....	60.5	50.0	10.5	17 3	53.7
Pensacola, Florida.....	71.2	56.7	14.5	10 3	61.5
Portland, Maine.....	47.0	41.5	5.5	16 6	42.0
Portland, Oregon.....	49.6	45.5	4.1	55 11	46.5
Provincetown, Massachusetts.....	51.0	43.1	7.9	12 8	43.7
Sandusky, Ohio.....	48.5	32.5	16.0	9 9	44.1
Sandy Hook, New Jersey.....	56.0	43.5	12.5	1 0	46.0
San Francisco, California.....	57.2	52.2	5.0	39 9	53.5
Savannah, Georgia.....	66.7	57.3	9.4	11 9	59.0
Smithville, North Carolina.....	66.4	53.2	13.2	10 0	55.8
Toledo, Ohio.....	48.2	32.4	15.8	11 0	44.2
Wilmington, North Carolina.....	63.0	51.0	12.0	21 8	57.0

* No observations from 1st to 8th, inclusive.

The temperature of water, as observed in rivers and harbors at the Signal Service stations, during November, 1883, with the average depth at which the observations were made, are given in the table below. The highest water temperature observed

during November, 80° 4, occurred at Key West, Florida, on the 1st; the lowest, 31°, occurred at Alpena, Michigan, on the 30th. The largest monthly ranges are: Galveston, Texas, 21° 7; Indianola, Texas, 23° 3; Cedar Keys, Florida, 24°. The smallest monthly ranges are: Eastport, Maine, 3° 5; Portland, Oregon, 4° 1; San Francisco, California, 5°; Portland, Maine, 5° 5.

ATMOSPHERIC ELECTRICITY.

AURORAS.

On the night of the 1st an auroral display was observed from Minnesota eastward to New England, and on the following night a display was observed throughout the northern portions of the United States. The latter display was observed as far southward, on the Atlantic coast, as Portsmouth and Fort Macon, North Carolina; over the central portions of the country it was not reported by stations farther southward than central Illinois; and west of the ninety-second meridian it was observed only at the more northerly stations.

The following reports, relating to the several displays of the month, have been received:

Eastport, Maine, 1st.—A faint auroral light was observed from 8 to 11 p. m.

Portland, Maine, 1st.—A faint aurora was observed from 8.30 to 9.25 p. m.

Boston, Massachusetts, 1st.—An auroral light of bluish-green color, extending over about 20° of the northern sky, was observed from 2.30 a. m. until daylight.

New Haven, Connecticut, 1st.—A dim auroral light was seen in the northern sky at 11 p. m.

Barnegat City, New Jersey, 1st.—A brilliant aurora was observed from 8.35 to 10.05 p. m. When first seen it consisted of a diffuse light of pale yellow color; at 9 p. m. luminous beams rose to an altitude of 25°, gradually fading and reappearing. The whole display was of varying brilliancy, the color at times being very bright.

Escanaba, Michigan, 1st.—A diffuse auroral light appeared at 7 p. m., and continued until 10 p. m., when the whole sky became covered with clouds, and a narrow band of yellowish light extended almost entirely around the horizon at an altitude of 4°, the band varying in width from one to one and one-half degrees.

Duluth, Minnesota, 1st.—From 8.30 to 9.45 p. m. a faint auroral light, with occasional streamers, was observed.

Dubuque, Iowa, 1st.—A bright white auroral light, over a bank of cloud, was observed in the northern sky from 7.10 to 11.30 p. m.

Other stations reporting the display of the 1st, are: Southington, Connecticut; Logansport, Indiana; Moorestown, New Jersey; Northfield, Minnesota.

Eastport, Maine, 2d.—An auroral arch was visible from 9 p. m. until the early morning of the 3d.

Point Judith, Rhode Island, 2d.—At 6 p. m. a faint auroral light appeared in the northern sky; at 8 p. m. a low arch formed, extending from northwest to northeast; at 8.15 p. m. beams of bright yellow color shot upward to an altitude of 30°. The display ended during the early morning of the 3d.

Captain H. R. Hughes, of the s. s. "Alene," reports having observed a brilliant aurora when off Barnegat, on the 2d.

Atlantic City, New Jersey, 2d.—At 6.30 p. m. an auroral arch extended over about 50° of the northern horizon; a few minutes later a band of light, 4° in width, rose from the top of the arch to an altitude of 40°. The display ended at 10.30 p. m.

Portsmouth, North Carolina, 2d.—A faint aurora was seen here from 8.20 to 9.15 p. m., consisting of a dull straw-colored arch.

Oswego, New York, 2d.—An auroral display began at 8 p. m. and was obscured by clouds at 10 p. m. It consisted of beams of light, of various colors, reaching a height of 45°.

Cleveland, Ohio, 2d.—A steady auroral light and an imperfect arch were visible from 7 p. m. until the morning of the 3d.

Escanaba, Michigan, 2d.—An aurora of variable brilliancy was observed from 6.30 to 9.15 p. m. Occasional beams appeared in the northeastern sky, converging to a point near the zenith.

Saint Vincent, Minnesota, 2d.—Auroral beams were visible during the early evening, but were soon obscured by clouds.

Springfield, Illinois, 2d.—At 8.30 p. m. a faint aurora was observed consisting of a diffuse rose colored light.

Fort Shaw, Montana, 2d.—A faint aurora was visible from 8 p. m. until the morning of the 3d.

Lewiston, Idaho, 2d.—An aurora was seen here from 8.10 to 10.30 p. m., extending over about 40° of the northern horizon.

Dayton, Washington territory, 2d.—A pale green auroral light, resembling the morning twilight, was visible from 6.45 to 11 p. m.

Port Angeles, Washington Territory, 2d.—A faint aurora, resembling the morning dawn, was visible in the northern sky from 6 to 9.30 p. m.

Other auroral displays were reported on the various dates as follows:

3d.—Mount Washington, New Hampshire; New Haven, Connecticut; Milwaukee, Wisconsin; Dubuque, Iowa; Fort Totten, Dakota; La Crosse, Wisconsin.

6th.—Marquette, Michigan; Duluth, Minnesota.

13th and 18th.—Boston, Massachusetts.

19th.—Block Island, Rhode Island; Oswego, New York.

21st.—Saint Vincent and Moorhead, Minnesota; Fort Totten, Dakota.

22d.—Boston, Massachusetts; Kitty Hawk, North Carolina; Marquette, Michigan; Milwaukee, Wisconsin; Saint Vincent, Minnesota; Fort Bennett and Yankton, Dakota.

27th.—Milwaukee, Wisconsin.

29th.—Logansport, Indiana.

30th.—Mount Washington, New Hampshire.

ATMOSPHERIC ELECTRICITY INTERRUPTING TELEGRAPHIC COMMUNICATION.

Leavenworth, Kansas.—The telegraph wires were affected by atmospheric electricity at this place, and at points eastward, on the 21st.

Portsmouth, North Carolina, 2d.—The working of the telegraph line was slightly disturbed at 8.30 p. m. of this date, being probably due to the influence of the aurora which was visible at that time.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories on the following dates:

Alabama.—22d, 26th.

Arkansas.—5th, 9th, 10th, 19th, 20th, 21st, 25th, 26th.

Colorado.—4th.

Florida.—26th.

Illinois.—4th, 5th, 7th to 10th, 20th, 21st, 22d, 25th, 26th.

Indiana.—5th, 8th, 9th, 20th, 21st, 25th, 26th.

Indian Territory.—21st.

Iowa.—4th, 5th, 8th, 9th, 20th, 21st, 24th, 25th.

Kansas.—4th, 5th, 8th, 21st, 25th.

Kentucky.—21st, 25th, 26th.

Louisiana.—21st, 26th.

Maine.—30th.

Michigan.—5th, 8th, 9th, 11th, 20th, 21st, 25th, 26th.

Minnesota.—5th, 25th.

Mississippi.—21st, 22d, 24th, 25th.

Missouri.—5th, 7th, 8th, 9th, 20th, 21st, 25th.

Nebraska.—4th, 5th, 8th, 25th.

New Hampshire.—9th.

New Jersey.—10th, 30th.

New York.—9th, 11th, 21st, 22d.

Ohio.—8th, 9th, 20th, 21st, 22d.

Pennsylvania.—9th, 21st.

Rhode Island.—1st.

Tennessee.—5th, 8th, 9th, 20th, 21st, 22d, 25th.

Texas.—7th to 10th, 18th, 19th, 21st, 22d, 24th, 25th, 26th.

Utah.—23d.

Vermont.—9th, 12th.

Washington.—24th.

Wisconsin.—4th, 5th, 7th, 8th, 9th, 20th, 21st, 25th, 26th, 29th.

Wyoming.—3d.

At Cambridge, Lamoile county, Vermont, during the storm of the 12th, a barn was struck by lightning and burned, resulting in a loss of \$8,000.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various states and territories on the following dates:

Arkansas.—2d, 7th, 8th, 9th, 19th, 20th.

California.—1st, 2d, 4th, 5th, 15th, 16th, 20th, 21st, 27th, 28th.

Dakota.—4th, 7th, 8th, 9th, 19th, 21st, 25th.

Florida.—3d, 22d.

Illinois.—7th, 9th, 13th, 19th, 27th, 28th, 29th.

Indiana.—26th, 27th, 28th.

Iowa.—3d, 8th, 19th, 29th.

Kansas.—8th, 13th, 24th to 27th, 29th.

Kentucky.—11th, 27th, 28th, 29th.

Maine.—10th.

Massachusetts.—2d, 6th, 8th, 13th, 15th, 17th, 20th, 22d.

Michigan.—14th, 22d.

Minnesota.—26th, 27th.

Mississippi.—2d, 16th, 19th.

Montana.—25th.

Nebraska.—11th.

New Hampshire.—20th.

New Jersey.—21st.

New York.—29th.

North Carolina.—4th, 9th, 18th, 30th.

Ohio.—5th, 7th, 12th, 13th, 29th.

Tennessee.—5th, 7th, 10th, 15th, 19th, 23d, 26th.

Texas.—15th.

Utah.—4th to 7th, 17th, 18th.

Vermont.—19th, 22d.

Virginia.—15th, 24th.

Wisconsin.—2d, 14th, 26th, 27th.

LUNAR HALOS.

Lunar halos have been observed in the various states and territories on the following dates:

Alabama.—8th, 9th, 10th, 13th, 15th, 17th.

Arizona.—5th.

Arkansas.—4th, 6th, 8th, 10th, 12th, 13th.

California.—6th, 8th, 17th.

Colorado.—8th, 10th, 21st, 22d.

Dakota.—5th, 7th, 8th, 9th, 13th, 17th, 19th, 21st, 25th.

District of Columbia.—7th.

Florida.—8th to 12th, 14th to 17th.

Georgia.—5th, 8th, 10th, 11th, 13th, 19th.

Idaho.—12th, 16th, 17th.

Illinois.—2d, 8th, 9th, 10th, 19th, 29th.

Indiana.—5th, 8th, 10th, 11th, 12th, 16th, 18th, 20th.

Iowa.—7th, 8th, 12th, 14th, 18th.

Kansas.—6th, 7th, 8th, 13th, 18th, 19th.

Kentucky.—11th, 20th.

Louisiana.—16th.

Maine.—5th, 13th.

Massachusetts.—8th, 20th.

Michigan.—3d, 8th, 9th, 13th, 14th, 18th, 20th.

Minnesota.—5th, 6th, 7th, 9th, 10th.

Missouri.—8th, 10th, 14th.

Montana.—14th, 15th.

Nebraska.—1st, 6th, 8th.

Nevada.—5th.

New Hampshire.—11th.
New Jersey.—9th, 10th, 15th.
New York.—5th, 7th, 8th, 19th, 20th, 25th.
North Carolina.—5th, 7th to 11th, 13th, 14th, 15th.
Ohio.—8th to 11th, 13th, 19th, 20th, 22d.
Oregon.—9th, 10th, 16th.
Pennsylvania.—5th, 9th, 11th.
South Carolina.—11th, 12th, 14th, 15th.
Tennessee.—5th, 7th to 10th.
Texas.—4th, 5th, 6th, 9th to 13th.
Utah.—8th, 19th.
Vermont.—15th.
Virginia.—7th to 10th, 13th, 15th.
Washington Territory.—6th, 7th, 8th, 11th, 12th, 17th.
Wisconsin.—7th, 8th, 9th, 14th.
Wyoming.—19th.

MIRAGES.

Portsmouth, North Carolina, 13th.—Portions of Hyde county, from twenty to twenty-five miles distant, and not ordinarily visible from this place, were plainly seen on this date, apparently elevated above the horizon.

Mirages were also observed at Indianola, Texas, on the 14th, 16th, 27th, 28th; at Salina, Kansas, from the 27th to 30th; and at Pretty Prairie, Kansas, on the 30th.

Captain Robert B. Quick, of the s. s. "Lone Star," from N. 38° 52', W. 74° 08' on the 22d, to N. 25° 27', W. 80° 03' on the 26th, reports that every light and object sighted were seen twice the distance at which they were usually visible. Hatteras light was seen a distance of thirty-five miles; objects on land, twenty miles; Frying Pan Lightship, twenty miles; and Canaveral Light, over thirty miles.

MISCELLANEOUS PHENOMENA.

A peculiar appearance of the sky preceding sunrise and following sunset has been reported by observers in nearly every part of the United States. This phenomenon has also been extensively observed in other countries.

Mr. A. C. Ranyard, in an article published in "Knowledge," of December 7, 1883, relative to its appearance in Europe, Asia, and Africa, ascribes the cause to meteoric dust.

The following reports have been received from the regular and voluntary observers of the Signal Service in the various states and territories:

Alabama.—Auburn, Lee county, 27th: the past week has been characterized by wonderfully brilliant and beautiful sunsets.

California.—Oakwood, San Diego county: from the 24th to 30th the sun was surrounded by a whitish glare during the day, and the sunset displays were of more or less intensity. The same conditions were observed here on October 18th.

Hydesville, Humboldt county: the mornings and evenings, from the 24th to 30th, were characterized by very brilliant twilight. In the morning the sky became red about an hour, or an hour and a half, before sunrise, and gradually faded as the sun arose. The evening twilights were more remarkable than those of the mornings. The sky began to grow red just after sunset, the color increasing in brilliancy for about an hour. On the evening of the 24th the southern sky was so bright as to resemble the light from a great fire.

Oakland, Alameda county: on the morning of the 25th, when the twilight first appeared, it gave out in the eastern sky a luminous, silvery color, gradually fading toward the horizon. As the sun came up the light rose nearer to the zenith, changing to a reddish pink and forming a crescent, beneath which was a pale green color of an apparent diameter of 60°. As the sun arose, the colors changed to a yellowish-red. The evening twilight was one of the most remarkable displays ever witnessed at this place. The succeeding days—from the 26th to 30th—were much the same, the crimson and lurid colors continuing long after sunset and before sunrise.

Salinas City, Monterey county, 30th: the red sunsets, so fre-

quently commented upon by the newspapers, have been noticeable here, also, with the same splendor as observed elsewhere. The sky was brightest at about ten or fifteen minutes after sunset, when everything was brilliantly lighted up by it.

Poway, San Diego county: a very brilliant crimson glow in the southwestern sky was observed here for several evenings near the close of the month.

Colorado.—Pueblo, Pueblo county, 30th: the eastern sky at sunrise, and just before, has been remarkably brilliant with a variety of colors. At sunset the display of rich golden colors over the mountain tops were so striking in their resemblance to a vast conflagration in the valley beyond as to occasion much comment.

Fort Collins, Larimer county: brilliant sunsets were observed here on the evenings from the 24th to 27th, and a very unusual appearance of the eastern sky preceded the rising sun on those dates.

Connecticut.—Watertown, New London county, 28th: very remarkable sunsets were observed here for several evenings preceding this date, the glow frequently growing brighter for some time after sunset. The sunset of the 28th exceeded in brilliancy any previously observed, the light resembling the appearance of a large fire in the distance.

Dakota.—Rapid City, Tennington county, 30th: the western sky at sunset of this date was of a very bright reddish color.

Huron, Beadle county: just before sunrise of the 28th, and after sunset of that date, a peculiar appearance of the sky was very noticeable here.

Florida.—Archer, Alachua county: very brilliant sunsets were observed here on the 15th and from the 22d to 30th.

Georgia.—Andersonville, Sumter county: at sunset of the 27th the western sky was of a bright orange color, extending from the horizon to an altitude of about 30°.

Forsyth, Monroe county: throughout the month the sky before and after sunset presented a beautiful appearance. On the evening of the 29th, just after sunset, streamers shot upward from the west, and the sky in that quarter resembled the aurora borealis.

Illinois.—Morrison, Whiteside county: lurid sunsets were observed here on the 26th, 27th, and 28th; and lurid sunrises on the 27th and 28th.

Swanwick, Perry county: a very remarkable sunset was observed here on the 27th. The sky was colored with various shades of red, which continued until darkness ensued. The same phenomenon was observed on several evenings and also before sunrise.

Springfield: peculiar colors were noticed in the sky accompanying sunrise and sunset from the 26th to 28th.

Indiana.—Vevay, Switzerland county: a beautiful golden sunset was observed here on the evening of the 27th.

Griffin Station, Rush county: the evenings of the 27th and 28th were noted for brilliant sunsets, that on the last mentioned date being especially bright.

Sunman, Ripley county: on the 28th the sky was overspread with a crimson glow resembling a bright aurora. The same phenomenon was observed on several evenings following.

Laconia, Harrison county, 30th: very brilliantly illuminated sunsets and sunrises were almost daily observed during the last three weeks.

Iowa.—Des Moines: on the 27th and 28th a remarkable redness was observed over the entire eastern sky about one hour before sunrise. The same was observed on the evenings of the same dates about one hour after sunset.

Manchester, Delaware county: three sunsets were observed here, viz: on the 26th, 27th, and 28th, which were remarkable on account of the brilliant colors in the western sky.

Humboldt, Humboldt county: before sunrise and after sunset on the 26th, 27th, and 28th, the sky assumed unusual brightness.

Muscataine, Muscatine county: remarkably bright sunsets were observed here on the 24th, 26th, 27th, and 28th.

Kansas.—Manhattan, Riley county: after sunset on the

evening of the 23d, the horizon from the southwest to northwest was of an unusually bright red color. Similar conditions were also noted on the 26th.

Clay Centre, Clay county: the western sky remained colored for an unusual length of time after sunset, from the 24th to 27th. Before sunrise, on those dates, a similar phenomenon was observed in the eastern sky.

Wellington, Sumner county: a phenomenal redness of the evening sky, and also the bright colors of the morning twilight, were prevalent from the 15th to 30th. On each of these dates the twilights were of dense reddish color, and continued from thirty to sixty minutes after sunset. The morning twilight also appeared bordered with a red or orange band above which the twilight curve extended toward the zenith, with a yellow and afterwards green zone.

Kentucky.—Frankfort, Franklin county: the month of November has been characterized by bright auroral lights at sunrise and sunset, the horizon being of a yellowish white color.

Louisville: the most notable and striking phenomenon of the month was the peculiar colors of the sky from the 15th to 30th. The light, at first a bright golden color, changed to bright and dull red colors. These conditions were observed both before the rising and after the setting of the sun.

Maine.—Cornish, York county: unusually brilliant sunsets were noted here on the 27th, 28th, and 29th.

Maryland.—Cumberland county: remarkably bright sunsets were observed on the 27th and 28th; the same colors appearing in the early sky before sunrise of the latter date.

Massachusetts.—Fall River, Bristol county: a phenomenal afterglow, resembling the light from an immense fire, was observed for about three-quarters of an hour after sunset on the 27th.

Blue Hill, Norfolk county: a deep red glow was observed for half an hour before sunrise and after sunset on the 27th and 28th. The same phenomenon was reported by many observers throughout Massachusetts.

Michigan.—Grand Rapids, Kent county: on the 27th the whole sky was of a fiery red color before sunrise. The sunset of the same date was especially remarkable, the western sky presenting a variety of colors and shades, beginning with an iron-gray at the horizon and gradually changing into yellow pink, purple, and red colors.

Thornville, Lapeer county: the sky presented a very red appearance before sunrise and after sunset from the 25th to 29th.

Missouri.—Saint Louis, 30th: since the 23d the southwestern sky presented a peculiar appearance for about two hours after sunset. The bright colors extended from the horizon to the zenith and frequently beyond. The sunrises were usually preceded by the same conditions.

Nebraska.—Omaha: bright red illuminations accompanied the rising and setting sun on the 27th, 28th, and 29th.

Mr. S. R. Thompson, director of the "Nebraska Weather Service," reports as follows: "Nearly all observers mentioned the beautiful red glow, lasting about an hour, at sunrise and sunset. This appearance has been noticed all over the world for the last week in November.

Nevada.—Carson City, Armstrong county: from the 18th to 30th the most beautiful sunsets were observed here, the sky being of a rose color for an hour after sunset. The sunset of the 28th was especially remarkable. On that evening the light (of a yellowish color) was so bright as to cast shadows.

New Hampshire.—Grafton, Grafton county: an unusual redness in the sky was noticed on the evenings of the 25th and 27th. At 6 p. m., or about one hour and a half after sunset, a bright reddish color extended to an altitude of 60° and covered the entire horizon.

New York.—Factoryville, Tioga county: from the 24th to 27th the eastern sky was illuminated to an unusual degree; the same peculiarity was also seen in the western sky after sunset on the same dates. This phenomenon was generally observed throughout New York.

North Carolina.—Brevard, Transylvania county: remarka-

bly bright twilights were observed here on the evenings of the 28th and 29th.

Ohio.—North Lewisburg, Champaign county: from the 26th to 29th a variety of bright colors illuminated the sky before sunrise and after sunset. Numerous stations throughout Ohio report having observed the same peculiarities preceding sunrise and following sunset.

Pennsylvania.—Leetsdale, Allegheny county: on the 28th a very remarkable sunset was observed. The sky was of a bright red color, resembling the light from an extensive fire. The light extended from the western horizon overhead nearly to the northeastern horizon.

Dyberry, Wayne county: from the 23d to the 28th bright colors appeared in the sky preceding sunrise and following sunset.

Texas.—Cleburne, Johnson county: beautiful morning and evening twilights were seen here from the 26th to 30th.

Galveston: a beautiful luminous display in the heavens before sunrise and after sunset was observed here on the 27th.

Virginia.—Variety Mills, Nelson county: the extraordinary colors visible in the eastern and western skies were observed on nearly every fair day during the month. They were most conspicuous on the 27th and 28th.

Washington territory.—Tatoosh Island: on the evening of the 24th, at about two hours after sunset, the sky became illuminated, at first by a brassy color about 10° above the horizon, gradually changing to deep red and extending from northwest to southwest, and to an altitude of 55°. The light, as it was reflected from the ocean, gave the latter a very weird appearance, and although the remainder of the sky was densely overcast, the light was sufficient to light up the island brightly.

Wisconsin.—Sussex, Waukesha county: very peculiar sunsets were observed on the 26th and 27th, the sky being illuminated with a variety of colors which continued for one and one-half hours after sunset.

Mr. C. Todd, C. M. G., international co-operating observer at Adelaide, South Australia, reports that during the last two weeks of September, and throughout October, an unusual phenomenon was observed in the western sky, consisting of the same peculiarities as reported by the observers throughout the United States.

Mr. T. E. Whitfield, of Corinth, Mississippi, has forwarded to the Chief Signal Officer a diagram, showing a very peculiar arrangement of clouds, as observed by him at that place on November 24th. The phenomenon was observed at 7 p. m., when twelve well-defined bands of dark clouds were seen diverging from a point beneath the "north" star. Four of these bands were east of the star named, and the remaining eight were west of it, those near the western limit of the display being shorter and less inclined toward the horizon. The lower ends of the seven largest clouds terminated abruptly at an equal distance from a common point near the northern horizon, leaving an almost perfect semi-circle of clear sky beneath, from which the bands radiated like the spokes of a wheel.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-six stations show 4,573 observations to have been made, of which six were reported doubtful; of the remainder, 4,567, there were 3,973, or 87.0 per cent., followed by the expected weather.

SUN SPOTS.

Mr. William Dawson, of Spiceland, Indiana, reports sun spots as follows:

1st.—Nine groups, ninety-five spots; much faculae.

4th.—Eight groups, eighty spots.

9th.—Six groups, thirty-five spots; air very poor.

11th.—Five groups, sixty spots; one large spot in the southern quadrant visible to the naked eye; air very good.

13th.—Five groups, sixty-eight spots; one large spot south of the centre plainly seen with the naked eye.

17th.—Seven groups, ninety-five spots; two spots visible to the naked eye.

24th.—Nine groups, sixty-three spots; a very condensed group near the west edge.

28th.—Four groups, twenty-six spots, most of which were near the centre of the sun; air very poor.

Mr. H. D. Govey, of North Lewisburg, Ohio, reports that sun spots were observed by him on all clear days during the month.

The following record of sun spots for the month of November, 1883, made at the Lawrence observatory, Amherst, Massachusetts, has been forwarded by Professor David P. Todd:

Date— Oct., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 3 p. m.	2	10½	0	0	2	10½	8	50	
4, 10 a. m.	0	0	0	5	0	0	8	35	
5, 10 a. m.	0	10½	1	1	0	0	7	45	
5, 3 p. m.	0	5	0	0	0	0	7	50	
6, 4 p. m.	0	0	1	10½	0	0	0	35	
7, 3 p. m.	0	0	1	5	0	0	5	25	
8, 10 a. m.	2	5	1	5	2	5	6	25	
12, 11 a. m.	0	15½					4	25	One of spots quite large.
14, 3 p. m.	1	5					4	30	Do.
15, 9 a. m.	0	5	0	0	0	0	4	35	
16, 9 a. m.	2	7	0	0	0	0	6	40	
17, 12 m.	1	10½	0	0	1	1	7	50	
17, 3 p. m.	0	0	0	0	0	0	7	50	
18, 1 p. m.	0	15½	0	5	0	2	7	60	
19, 2 p. m.	0	0	1	10½	0	0	6	50	
25, 12 m.	4	15½					6	30	
26, 9 a. m.	0	0	2	12½	0	0	3	20	
27, 12 m.	1	1	0	0	0	0	4	20	
28, 10 a. m.	0	0	0	0	0	0	3	15	
29, 11 a. m.	0	5	0	0	0	0	3	20	

Faculae were seen at the time of every observation. † Approximated.

METEORS.

Allison, Decatur county, Kansas.—A brilliant meteor was seen here at 7. p. m. of the 1st, which, before disappearing, exploded into many pieces.

Nephi, Juab county, Utah.—A large meteor was seen at this place on the 1st, moving in a northwesterly direction, and exploding when at an altitude of 20°.

Weldon, Halifax county, North Carolina.—A meteor was observed here at 6.55 p. m. of the 1st, and moving westward from the zenith it exploded after passing the "milky way."

Pensacola, Florida, 3d.—At 11.05 p. m. of this date a large and brilliant meteor of whitish color was observed in the western sky. It moved directly downward, and exploded when at an altitude of 25°. At 9.20 p. m. of the 7th, another meteor was seen in the southeastern sky, and moving westward it exploded when at an altitude of 30°.

Augusta, Georgia.—A meteor was observed here at 8.30 p. m. of the 4th. It made its appearance in the southwestern sky at an altitude of 70°, and, moving directly downward, disappeared at an altitude of 25°.

Provincetown, Massachusetts.—A large and brilliant meteor was observed in the southern sky, at 9.40 p. m., of the 9th.

New Haven, Connecticut.—A meteor, apparently as large as the full moon, was seen in the northern sky at 2 a. m., of the 13th.

Cooperstown, Otsego county, New York.—A meteor of unusual size and brightness, was observed here at 9.10 p. m., of the 20th, passing from the northwestern to the southwestern sky.

Murfreesborough, Rutherford county, Tennessee.—A large meteor was observed here at 7.20 p. m., of the 23d. It was first seen in the square of "Andromeda," and, moving westward, disappeared when within 30° of the horizon.

Milan, Gibson county, Tennessee.—A large meteor was seen here on the 23d at 6 p. m., at an altitude of about 15°, moving in a southerly direction.

Meteors worthy of less remark were observed in the several states and territories as follows:

Arkansas.—Lead Hill, 8th, 11th, 23d, 26th, 28th, 29th.

Connecticut.—Bethel, 25th.

Dakota.—Alexandria, 1st, 10th, 12th, 28th.

Florida.—Archer, 6th.

Illinois.—Anna, 1st; Bunker Hill, 2d, 4th; Morriston, 3d, 29th.

Indiana.—Vevay, 1st, 4th, 14th, 15th.

Iowa.—Manchester, 2d; Davenport, 15th, 28th; Burlington, 30th.

Kansas.—Fort Scott, 6th, 16th, 18th, 30th; Salina, 12th, 14th; Yates Centre, 15th; Manhattan, 16th, 21st; Clay Centre, 18th, 21st.

Maryland.—Woodstock, 1st.

Massachusetts.—Fall River, 3d, 17th, 25th; Somerset, 4th; Rowe, 25th.

Nebraska.—Clear Creek, 2d, 18th.

New Hampshire.—Grafton, 26th.

New Jersey.—Readington, 2d, 7th; South Orange, 3d.

New York.—Humphrey, 5th.

North Carolina.—Wilmington, 5th.

Ohio.—Westerville, 4th.

Oregon.—Astoria, 2d.

Pennsylvania.—Erie, 4th, 27th.

Rhode Island.—Block Island, 18th.

Tennessee.—Milan, 23d.

Texas.—Brownsville, 5th; Palestine, 6th, 8th.

Utah.—Nephi, 4th.

Virginia.—Fort Myer, 1st.

Washington.—Fort Canby, 2d, 13th.

Wisconsin.—Franklin, 18th; Manitowoc, 19th.

EARTHQUAKES.

Salt Lake City, Utah, 5th.—A shock of earthquake was felt at Cove Creek, in this territory, on the 4th. No damage was done.

Poway, San Diego county, California.—A slight shock of earthquake occurred here at 6.15 p. m. of the 11th.

The following extract is taken from the "New York Daily Advertiser" of November 26th, 1883:

PANAMA, UNITED STATES OF COLOMBIA, November 17th.—Slight earthquake shocks were felt on the isthmus on the 13th instant, and a week earlier other shocks occurred. They were accompanied by loud detonations similar to those heard in the same districts at the time of the Java earthquakes in August last. These districts are all in the latitude, and are not far from the Leon and Lucio region in which a number of mud volcanoes have sprung into existence.

From the "New York Maritime Register" of November 21st, 1883, the following is taken:

Several vessels of recent arrival at San Pedro, California, report having experienced heavy shocks of earthquake off Cape Mendocino, California.

MIGRATION OF BIRDS.

Geese flying southward.—Red Bluff, California, 16th; Fort Sully, Dakota, 3d, 4th, 8th; Muscatine, Iowa, 6th, 13th; Yates Centre, Kansas, 5th, 6th; Eastport, Maine, 14th, 16th; Provincetown, Massachusetts, 10th; Somerset, Massachusetts, 10th, 12th, 14th; Saint Louis, Missouri, 25th; Clear Creek, Nebraska, 11th, 12th; Ardenia, New York, 16th; Humphrey, New York, 8th; Portland, Oregon, 19th, 20th; Leetsdale, Pennsylvania, 2d; Chambersburg, Pennsylvania, 11th; Block Island, Rhode Island, 19th; Point Judith, Rhode Island, 13th, 14th, 17th, 19th; Indianola, Texas, 16th; Palestine, Texas, 5th, 6th; Johnsonstown, Virginia, 30th. Flying northward.—Cape Mendocino, California, 25th; Sanford, Florida, 6th; Cairo, Illinois, 25th; Fort Madison, Iowa, 21st, 30th; Omaha, Nebraska, 30th; Ashwood, Tennessee, 27th. Flying eastward.—Edgington, Illinois, 4th. Flying westward.—New Bedford, Massachusetts, 18th. At San Francisco, California, geese were numerous during the entire month.

Ducks flying southward.—Little Rock, Arkansas, 11th; San Francisco, California, 30th; Fort Scott, Kansas, 5th, 25th; Yates Centre, Kansas, 5th; Clear Creek, Nebraska, 8th, 11th,

12th; Fort Macon, North Carolina, 12th; Leetsdale, Pennsylvania, 1st; Point Judith, Rhode Island, 13th, 14th; Indianola, Texas, 28th. *Flying northward*.—Edgington, Illinois, 3d, 7th, 8th, 10th, 24th; Yates Centre, Kansas, 25th; Mackinaw City, Michigan, 16th. *Flying eastward*.—Little Rock, Arkansas, 11th, 12th; Fort Scott, Kansas, 4th. *Flying westward*.—Yates Centre, Kansas, 23d.

Cranes flying southward.—Yates Centre, Kansas, 6th; West Leavenworth, Kansas, 1st; Portland, Oregon, 15th.

PRAIRIE AND FOREST FIRES.

Cantonment, Indian Territory.—Prairie fires prevailed in this vicinity from the 22d to the 26th. On the latter date they were very destructive near Red Hills.

Fort Reno, Indian Territory.—Prairie fires occurred here from the 1st to 10th, 12th, 13th, 16th to 20th, 22d to 25th; those occurring on the last mentioned dates caused much damage, especially to the telegraph lines.

Prairie and forest fires also occurred at the following stations: North Platte, Nebraska, 19th, 21st, 23d, 27th to 30th; Dodge City, 26th; Fort Elliot, 24th, 25th; Huron, Dakota, 2d; Fort Meade, Dakota, 1st, 30th; Fort Randall, Dakota, 18th, 19th; Lead Hill, Arkansas, 12th, 17th.

POLAR BANDS.

Lead Hill, Arkansas, 5th, 6th, 11th, 16th, 23d, 26th to 29th.
Los Angeles, California, 1st, 2d, 5th, 6th, 25th.
Areher, Florida, 3d, 12th, 14th, 17th.
Riley, Illinois, 2d, 3d, 30th.
Guttenburg, Iowa, 24th.
Yates Centre, Kansas, 7th, 8th.
Gardiner, Maine, 5th, 15th.
Somerset, Massachusetts, 13th, 27th.
Clear Creek, Nebraska, 4th, 25th, 29th, 30th.
Wauseon, Ohio, 2d, 7th, 29th.
Pittsburg, Pennsylvania, 11th.
Nashville, Tennessee, 5th, 7th, 8th.
Woodstock, Vermont, 15th, 25th.

WATER-SPOUTS.

New Haven, Connecticut.—A water-spout, one hundred feet in height, was seen off Nonauk, Connecticut, on the afternoon of the 12th.

The schooner "Ella A. Warner," at 3 p. m. of November 22d, when in N. 22° 45', W. 69° 13', saw two whirlwinds passing from eastward and throwing water twenty feet high.

The s. s. "Neckar," between N. 46° 55', W. 39° 07', and N. 45° 07', W. 45° 32', on November 27th, passed several water-spouts of considerable dimensions.

ZODIACAL LIGHT.

Little Rock, Arkansas, 1st, 25th to 29th.
Los Angeles, California, 19th, 22d to 25th.
Pensacola, Florida, 1st, 30th.
Humboldt, Iowa, 23d, 26th, 27th, 28th.
Cambridge, Massachusetts, observed, 16th, 17th, 18th, 25th, 27th, 28th; suspected, 30th.
Toledo, Ohio.—26th to 29th.
Fallsington, Pennsylvania, 2d.
Haverford College, Pennsylvania, 5th, 6th, 8th, 12th.
Nashville, Tennessee, 25th.
Palestine, Texas, 1st, 6th, 16th.

DROUGHT.

Bangor, Maine, 3d.—The mills at this place, which have been shut down for several weeks on account of scarcity of water, resumed operations on this date.

Cape Lookout, North Carolina, 27th.—Owing to the continued drought, all of the cisterns in this vicinity have become dry, and scarcity of water exists.

Jacksonville, Florida, 30th.—Rain is much needed in this vicinity for the winter vegetables.

SAND STORMS.

Fort McDowell, Arizona, 12th, 29th.

Maricopa, Arizona, 12th.
San Carlos, Arizona, 1st, 4th, 12th, 29th.
Willcox, Arizona, 29th.
Fort McDermitt, Nevada, 24th.

ERRATA.

In the September, 1883, REVIEW, under "deviations from mean temperature," on page 206, the mean temperature at Dyberry, Wayne county, Pennsylvania, should have been 4° below the normal, and not 4° above the normal as published.

The meteorological summary forwarded by the director of the Indiana Weather Service and published in the September REVIEW under "Notes and extracts," was for September, 1883, and not for September, 1882, as stated.

NOTES AND EXTRACTS.

WEATHER REPORT FOR NOVEMBER, 1883.

Prepared by Prof. F. H. Snow, of the University of Kansas, from observations taken at Lawrence.

Only two Novembers on our sixteen years record have had more sunshine than this. The temperature was above the average. The rainfall and humidity were below the average, but there was an unusual number of morning fogs.

The mild weather of the past three Novembers has been in marked contrast with the severe winter temperature of November, 1880, during the last week of which month a large crop of ice was harvested at Lawrence.

Mean temperature.—42° 77, which is 3° 55 above the November average. The highest temperature was 74°, on the 23d; the lowest was 14° 5, on the 14th, giving a range of 59° 5. Mean temperature at 7 a. m., 36° 57; at 2 p. m., 51° 97; at 9 p. m., 41° 27. The first severe frost of the autumn occurred on the 1st, twelve days later than its average date. There were only four winter days during the month, days whose mean temperature was below the freezing point. There were sixteen such days in November, 1880.

Rainfall.—0.73 inch, which is 1.36 inches below the November average. Rain fell on two days. There were two thunder-showers. The entire rainfall for the eleven months of 1883, now completed, has been 39.88 inches, which is 7.33 inches above the average for the same months in the preceding fifteen years.

Mean Cloudiness.—38.22 per cent. of the sky, the month being 9.38 per cent. clearer than usual. Number of clear days (less than one-third cloudy) eighteen; half clear (from one to two-thirds cloudy) five; cloudy (more than two-thirds) seven. There were six entirely clear days, and only one entirely cloudy. Mean cloudiness at 7 a. m., 47.67 per cent; at 2 p. m., 37.67 per cent; at 9 p. m., 29.33 per cent.

Wind.—Southwest, forty-four times; northwest, eighteen times; southeast, ten times; northeast, seven times; south, five times; north, four times; west, once; east, once. The total run of the wind was 12,692 miles, which is six hundred and sixty-two miles above the November average. This gives a mean daily velocity of four hundred and twenty-three miles, and a mean hourly velocity of seventeen and sixty-three hundredths miles. The highest velocity was fifty-eight miles an hour on the 25th.

Barometer.—Mean for the month, 29.147 inches; at 7 a. m., 29.190 inches; at 2 p. m., 29.131 inches; at 9 p. m., 29.120 inches; maximum, 29.799 inches on the 12th; minimum, 28.646 inches on the 25th; monthly range, 1.153 inches.

Relative Humidity.—Mean for month, 63.6; at 7 a. m., 76.5; at 2 p. m., 45.3; at 9 p. m., 69.9; greatest, one hundred on the 8th and 23d; least, thirteen, on the 17th. There were five fogs.

The following table furnishes a comparison with the fifteen preceding Novembers:

November.	Mean temperature.	Maximum temperature.	Minimum temperature.	Winter days.	Rain (inches).	Snow (inches).	Rainy days.	Thunder-storm.	Mean cloudiness.	Humidity.	Number of fogs.	Miles of wind.	Mean barometer.	Maximum barometer.	Minimum barometer.
1868	37.99	73.0	17.0	12	3.54	6.0	0	0	51.77	59.8	1	29.201	29.660	28.880	
1869	37.39	72.0	23.0	9	1.80	0.0	0	0	62.89	72.3	2	29.111	29.447	28.500	
1870	44.94	72.0	17.0	2	0.57	0.0	3	0	36.83	72.9	0	29.151	29.605	28.658	
1871	35.89	72.5	3.0	13	2.45	5.0	12	1	57.44	72.3	4	29.105	29.540	28.641	
1872	33.30	67.0	0.1	14	0.01	0.0	1	0	44.89	55.8	0	29.202	29.174	28.650	
1873	42.58	78.0	12.0	4	1.24	0.0	2	0	35.00	55.4	0	29.414	29.129	28.593	
1874	38.76	77.5	5.5	12	3.69	14.0	10	0	50.67	72.4	2	29.104	29.164	29.257	
1875	35.55	70.0	2.0	11	0.30	0.0	3	0	52.78	54.1	0	29.282	29.132	28.582	
1876	37.50	72.0	9.0	8	2.60	3.5	0	0	46.11	70.9	0	29.287	29.171	28.775	
1877	39.23	64.0	9.0	5	1.47	0.0	0	0	48.89	73.8	1	29.494	29.109	28.797	
1878	45.87	72.0	22.0	0	1.05	2.0	5	0	42.00	62.6	1	29.196	29.137	28.035	
1879	44.30	76.5	16.0	5	5.15	2.0	0	4	38.33	70.6	3	29.194	29.147	28.716	
1880	31.58	65.5	7.5	16	2.24	2.5	9	0	51.77	74.4	2	29.323	29.295	28.782	
1881	40.40	71.5	11.0	6	2.55	0.0	5	2	45.55	66.9	2	29.500	29.186	28.599	
1882	43.07	80.0	20.0	3	2.08	0.0	7	0	43.11	72.0	0	29.118	29.241	28.779	
1883	42.77	74.0	14.5	4	0.73	0.0	2	2	38.22	63.9	5	29.147	29.795	28.046	
Mean.	39.44	72.3	11.7	8	1.98	2.2	6	1	47.02	71.1	1	29.085	29.166	28.650	

* Below zero.

Abstract of meteorological observations for the month of November, 1883, as reported to the Bureau of Agriculture, &c., of Tennessee, by voluntary observers in co-operation with General W. B. Hazen, Chief Signal Officer, U. S. A.

County.	Station.	Latitude north.	Longitude west of Washington.	Temperature.				Prevailing direction.	Wind.		Number of days—										On which rain fell, including hail, snow, and sleet.	Total rainfall, including hail, snow, and sleet (in inches).	Observers.							
				Mean of 7 a. m.	Mean of 2 p. m.	Mean of 9 p. m.	Average monthly.		Highest.	Date.	Lowest.	Date.	Greatest force.	Scale 0 to 10.	Date.	Clear.	Fair.	Cloudy.	Auroras.	Dew.				Fog.	Frost.	Lunar halos.	Solar halos.	Hail storms.	Thunder storms.	
Bedford	Flat Creek	35 30	8 40	44	59	48	50	72	8	16	16	s.	h. 5.	12	6	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.99	William Hart.
Blount	Maryville, 950 ft.	35 45	7 00	42	55	48	49	76	21	19	16	w.	h. 7.	21	13	9	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.43	W. H. Henry.
Campbell	Careyville	36 00	7 30	40	55	46	47	65	23	14	17	sw.	br.	7	1	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.01	D. Hart.
Carroll	McKenzie, 515 ft.	36 10	11 30	44	55	49	49	72	9	16	10	nw.	h. 7.	21	17	2	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.37	John Brown.
Coffee	Manchester, 1,000 ft.	35 20	9 04	40	60	45	47	74	8	14	16	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.07	Wiley Hickerson.
Coffee	Beech Grove, 1,000 ft.	35 30	9 06	43	63	47	50	73	23	16	16	e.	br.	17	3	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.37	B. F. Cheatham.
Cumberland	Grassy Cove, 1,200 ft.	36 00	8 00	41	54	42	45	68	10	12	16	n.	h. 6.	12	15	3	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.88	Nettie M. Stratton.
Crockett	Gadsden	35 45	12 00	46	57	52	52	73	21	20	16	sw.	h. 5.	21	10	11	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.61	M. T. Moore.
Davidson	Nashville, 507 ft.	36 11	8 52	41	56	44	47	71	21	12	16	sw.	h. 5.	21	11	11	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.07	L. N. Jesunofsky.
DeKalb	Smithville (n. r.), 1200	35 50	8 40	41	56	44	47	71	21	12	16	sw.	h.	9	10	3	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.10	P. C. Blumh.
Dyer	Dyersburg	36 20	13 00	42	57	47	48	76	9	17	16	s.	br.	12	6	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.90	L. Hughes.
Gibson	Trenton, 450 feet	36 00	11 58	43	55	47	48	73	21	16	16	sw.	h. 7.	21	12	9	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.45	A. S. Currey.
Gibson	Milan, 440 ft.	35 55	11 46	43	59	47	49	76	8	15	16	s.	h. 6.	21	13	6	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.45	M. D. L. Jordan, M. D.
Giles	Pulaski, 650 ft.	35 15	10 00	44	61	45	49	71	9	17	16	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.80	W. T. Mann.
Greene	Greenville, 1,581 ft.	36 10	8 49	42	58	46	48	73	21	19	16	nw.	h.	30	14	5	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.10	E. Link.
Hamilton	Chattanooga, 783 ft.	35 04	8 13	45	59	50	51	70	9	17	16	n.	h.	37	10	11	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.79	B. L. Goulding.
Hardeman	Bolivar, 453 ft.	35 18	12 00	45	59	49	50	74	21	18	16	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.46	E. P. McNeal.
Hardin	Savannah, 400 ft.	35 20	11 40	42	60	48	49	76	5	17	16	ne.	h. 6.	21	12	8	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.22	H. H. Hinkle.
Humphreys	Waverly	36 00	10 45	42	60	57	54	76	10	16	16	ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.30	D. R. Owen.
Lincoln	Howell	35 15	9 30	42	60	48	49	74	6	18	16	n.	h.	11	7	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.96	O. R. Hatcher, M. D.
Marion	Fostoria, 1,200 ft.	35 10	8 50	40	59	46	48	69	30	14	16	n.
Montgomery	Sailor's Rest	36 24	10 35	nw.	br. 4.	12	17	3	10	6.83	Charles Foster.
Overton	Hillham, 660 ft.	36 22	8 26	42	57	46	48	75	23	12	16	sw.	br. 4.	12	11	7	7.12	John Minor.
Polk	Parksville, 900 ft.	35 10	7 45	41	60	52	51	78	20	18	17	s.	6.96	J. A. Laughlin.
Rutherford	Murfreesboro, 580 ft.	35 50	9 25	45	59	49	50	72	9	15	16	s.	br. 4.	14	9	10	11	3.09	Jno. C. Williamson.
Rutherford	Florence Station	35 53	9 26	47	58	50	51	75	10	19	16	nw.	br.	11	12	7	11	3.11	H. H. Clayton.
Rhea	Grand View, 1,635 ft.	35 45	7 48	36	55	42	44	69	11	10	17	nw.	br. 4.	27	11	9	10	5.9	C. F. Vandeford.
Shelby	Memphis, 245 ft.	35 07	13 07	sw.	h.	14	9	7	4.56	Hattie R. Stratton.
Shelby	Woodstock	35 16	13 05	45	61	51	53	75	31	23	15	s.	h. 7.	21	14	7	6	2.73	D. T. Flannery.
Smith	Ridgely, 548 feet.	36 19	9 07	43	51	49	47	82	11	17	16	nw.	h.	35	12	8	10	6.00	C. W. Graves, 27 days.
Smith	Alexandria (near)	35 30	8 56	br.	7	5	11	1.66	S. P. Ferguson.
Tipton	Covington	35 30	12 38	45	59	49	50	75	31	20	16	n.	h. 10	21	13	5	12	2.6	I. Beckwith, 23 days.
Washington	Jonesboro	36 18	5 28	40	53	46	48	70	31	16	16	sw.	br.	13	4	13	2.18	T. W. Roane, M. D.
Williamson	Franklin, 650 ft.	35 50	9 48	43	50	47	48	74	10	16	16	s.	h.	31	13	2	15	2.86	Charles Mason.
Warren	McMinnville, 950 ft.	35 45	8 45	44	54	48	48	76	9	17	16	s.	br.	11	7	13	3.20	Samuel Henderson.
																													R. M. Reams.	

REPORT OF THE MISSOURI WEATHER SERVICE, NOVEMBER, 1883.

The mean temperature of November at Saint Louis has been $46^{\circ}.7$, which is $3^{\circ}.8$ above the average November temperature of the last forty-eight years, $3^{\circ}.3$ cooler than the warmest November, 1837, and $14^{\circ}.6$ warmer than the coolest November, 1880, of that period.

The highest mean temperatures reported from the stations were $50^{\circ}.1$ from Cairo, Illinois, $49^{\circ}.5$ from Louisiana, and $49^{\circ}.1$ from Bolivar. The lowest mean temperatures were $40^{\circ}.4$ at Kirksville, $40^{\circ}.8$ at Booneville, $41^{\circ}.3$ at Oregon, $41^{\circ}.8$ at Lexington, and $42^{\circ}.8$ at Keokuk, Iowa. The extreme temperatures observed during the month at Saint Louis were $15^{\circ}.5$ on the 16th and 72° on the 8th. The lowest temperature ever observed in Saint Louis during November was minus $0^{\circ}.5$, in the year 1845, and highest, $81^{\circ}.5$, 1837.

In the state the highest temperatures reported were 78° at Chamois and Sedalia, and 77° at Glasgow and Harrisonville. The lowest temperatures were 5° at Centerville, 7° at Booneville, and 9° at Mexico and Sedalia. The extremes of temperature have, therefore, occurred in the central part of the state.

The rainfall at the central station was 2.18 inches, although the station at the water-works reports 3.57 inches. The normal rainfall at Saint Louis is 2.95 inches. In the state the rainfall has been greatest in the southeast quarter, the maximum, 6.8 inches, occurring at Ironton.

West of a line connecting the northeast and the southwest corners of the state the fall has been less than two inches, the average in this region being 1.75 inches. The least fall, 1.08, is reported from Oregon.

No snow has fallen during the month. The observer at Oregon remarks that the past November and that of 1865 are the only ones in twenty-five years in which no snow has fallen.

From the 23d to the 30th the sky, after sunset and before sunrise, has shown a remarkable glow of red, the phenomena being also widely observed over the whole country. The following observations are communicated from the stations:

Oregon.—The sky at sunset has been red, gradually fading to a bright light, similar to the zodiacal light, from the 23d to the 30th, inclusive. Sunrise has been accompanied with the same appearance. These phenomena disappeared usually at 18.45 in the evening, and appeared at 5.00 in the morning.

Lexington, 27th.—Red sunset sky. Illumination extends to zenith and beyond. 28th, remarkable red sunset.

Glasgow.—Sunset and sunrise have been accompanied by a remarkable redness, long preceding sunrise and following sunset. A great many people have spoken about it.

Centerville, 26th.—At 7.30 p. m. (19.30) the whole southern horizon shows a bright fiery crimson, the centre being apparently where the sun sets, ex-

tending from west to southeast. Is it an aurora in the wrong place, or the woods on fire? But the woods are too wet to burn!

Other stations report a red sunset without calling special attention to it.

On November 5th, at 14 hours, a tornado passed through Springfield, causing much destruction to property, and resulting in the death of four persons. The path had a length of about one mile, and width of one block. Severe local winds were reported at other points in the state the same afternoon. Some damage occurred four miles north of Marshfield. At Brookline a small tornado occurred. At Troy, at 18.30 o'clock, "the wind suddenly changed to northwest and blew a perfect gale for about twenty minutes, blowing off chimneys and smashing in windows. In the surrounding country fencing was blown down, trees blown up by the roots, and some out-buildings wrecked. Soon after dark a heavy cloud passed several miles west, bearing in its front a brilliant red light, which made objects in the streets distinctly visible, although nothing appears to have happened more than a heavy rain when the cloud passed."

FRANCIS E. NIPHER, Director.

Washington University, December 10, 1883.

IOWA WEATHER BULLETIN FOR NOVEMBER, 1883.

November, 1883, was very clear and sunny, warm, and, in all but southeastern Iowa, quite dry; westerly and southeasterly winds were almost equally prominent.

The mean temperature of the air was one and a half degrees above normal. November is the first month since last April being above normal. The middle decade was coldest, nearly five degrees below normal; the first and last decades were almost as high above normal. The sun thermometer averaged forty degrees above the temperature of the air at noon. Plowing and tree planting possible till the close of the month.

The cloudiness was remarkably low: only once in thirty-four years was November as bright, namely: in 1865. The number of fine days was very great; warm and fine, Indian summer weather marking the first and last days of the month, and cold, clear weather prevailing during the middle decade.

The most notable storms occurred on the eighth and twenty-fifth. The first of these thunderstorms was more local, with very heavy hail at Iowa City; the second thunder-storm can be traced as a severe squall from Algona to Davenport, and was also quite severe in the northeast, causing everywhere a very sudden and great depression of the temperature. The high northwesterly winds of the 11th and 13th also lowered the temperature, the latter bringing the thermometer down to zero in the northwest of Iowa on the morning of the 15th.

During the foggy and rainy weather of the 20th and 21st, tornadoes

occurred in southeastern Missouri, while, during the extended rain and thunder-storm of the 5th, Springfield, in southwestern Missouri, was visited by a tornado. As stated before, Iowa has never been visited by a tornado in the months from November to March, inclusive.

The rainfall was very light in the entire western half of the state, and averaged about two inches for the eastern half, being greatest from Clinton over Johnson to Jefferson county, and east to the great river. The number of rain days was one to three in the west, and five in the east. No real snow storm has yet occurred this fall.

A bright, bursting meteor was seen at Ames on the 1st. The northern lights were bright on the 1st, less so, but more extendedly visible, on the 2d.

The most beautiful phenomena of the entire month were the varying and brilliant tints of sunset during the last five days of the month.

GUSTAVUS HINRICHS.

CENTRAL STATION, I. W. S., December 5, 1883.

The winter, now beginning, will probably be a moderate or mild winter for Iowa and the adjacent parts of the northwest. The observations of the past ten years make the above probability very high, and, taking into account the entire series of forty years' observations, the chances for this winter proving a severe one are less than one in twenty.

The following report has been forwarded by Mr. W. H. Ragan, director of the "Indiana Weather Service:"

The maximum temperature throughout the state was on the 9th; the minimum on the morning of the 16th. The warmest day in the northern sections was the 21st, in the southern, the 9th. The minimum temperature was reported from Tippecanoe county, the maximum from Switzerland county. The mean temperature for the state is 2.24 above the mean for November, as reported by the United States Signal Office at Indianapolis for a period of thirteen years.

The mean precipitation is 1.17 inches above the average for thirteen years at the Signal Office at Indianapolis, and 1.55 inches greater than the average of November for four years at Lafayette.

Snow, inappreciable, occurred on the 13th at Lafayette; also in Wayne, Fayette, and Johnson counties.

The following extract is taken from the report of the "Tennessee Weather Service" for November, 1883:

The mild temperature during the greater portion of the past month was very favorable for the maturity of the late crops, and for gathering those that were ready to be housed, and farmers generally took advantage of the opportunity presented, and, as a result, perhaps a larger proportion of these crops were gathered and housed, and marketed during the month, than for many years past. The cold weather of about the middle of the month checked, to some extent, the yield of some, but, taking it altogether, farmers have but little cause of complaint as to the conditions.



Chart C Tracks of Low-Barometer Areas - NOVEMBER 1883

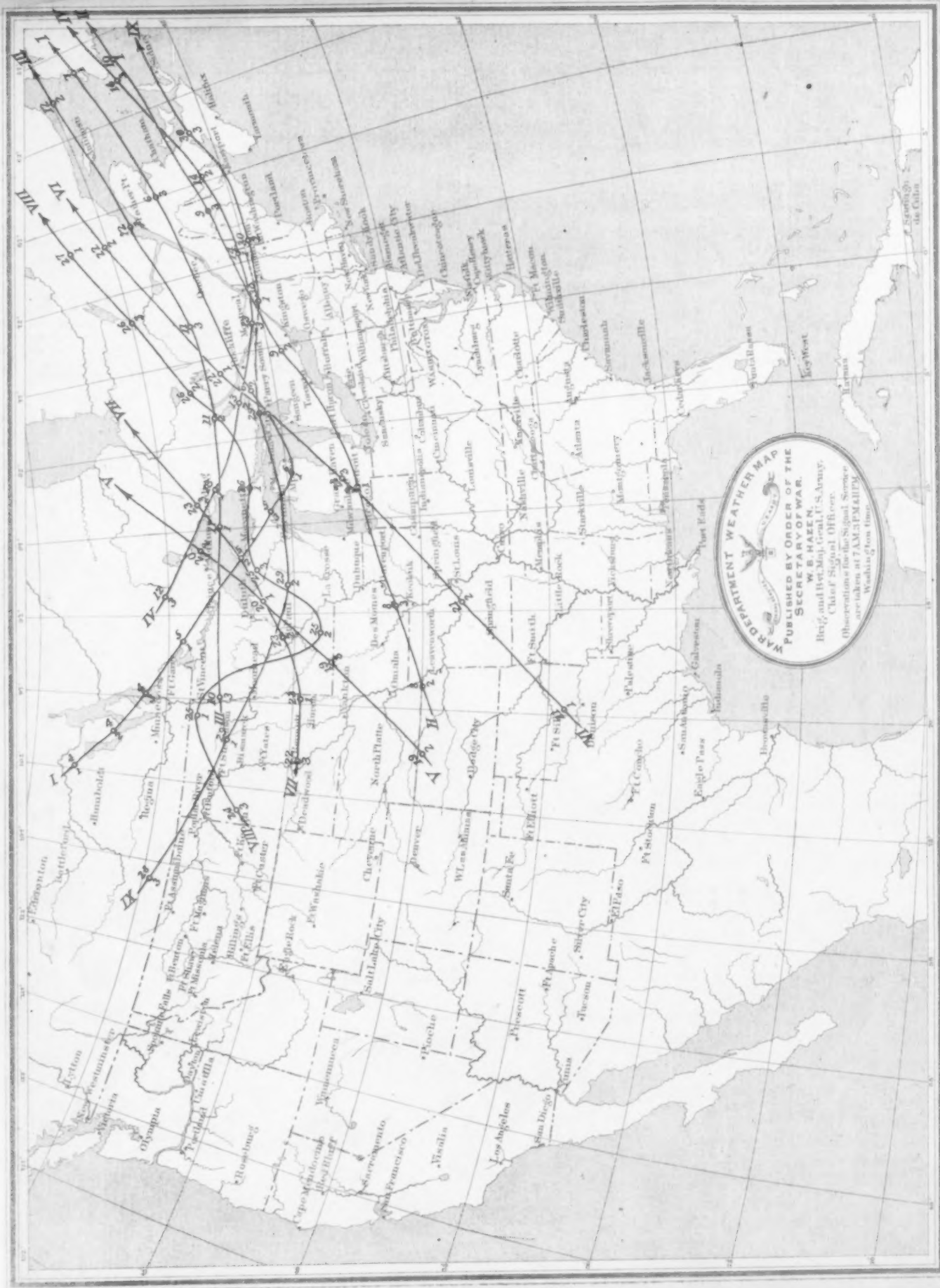


Chart II Ocean Storm Tracks, NOVEMBER 1888.

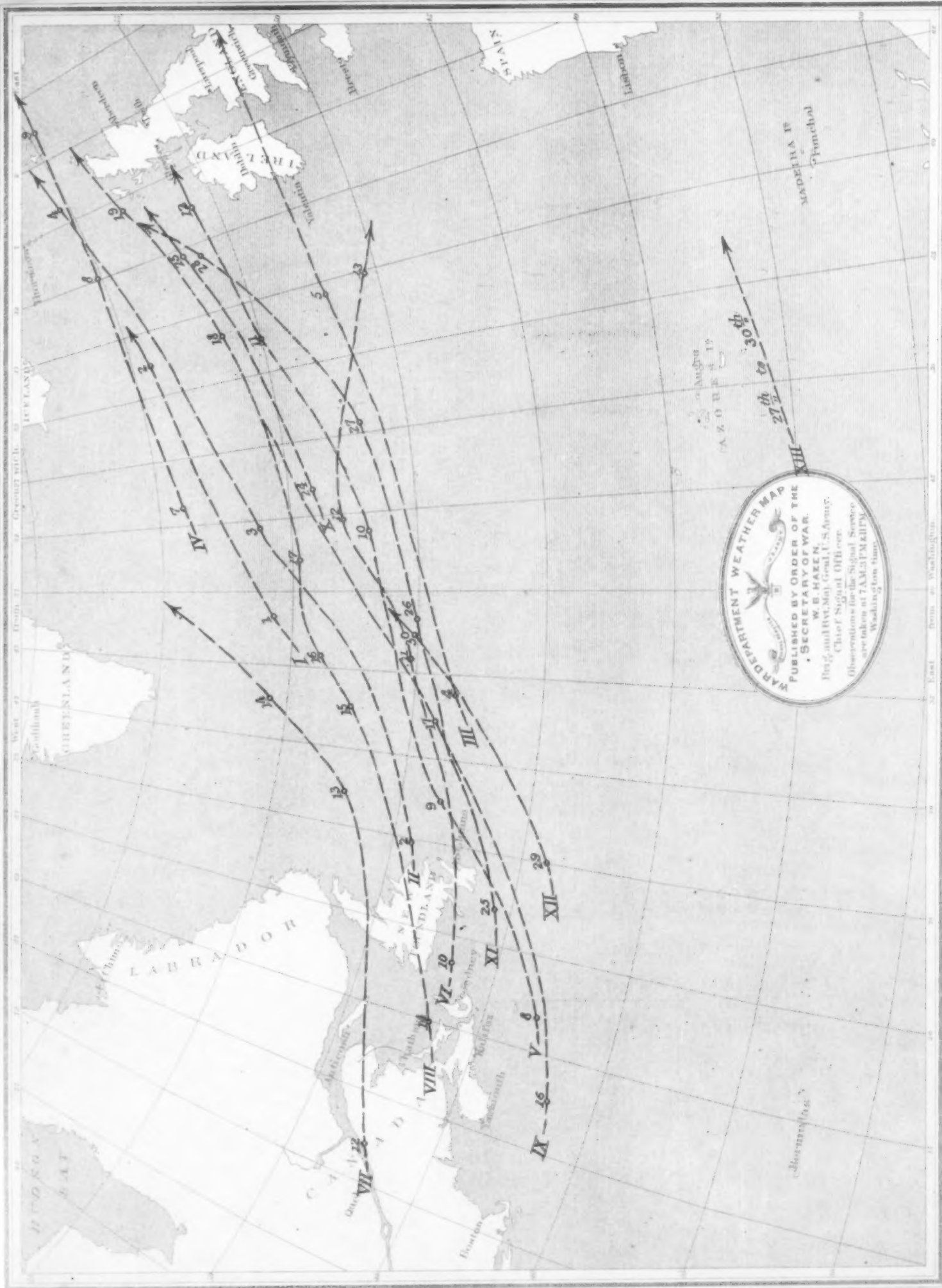


Chart III. Isotherms, Isotherms, and Winds. November, 1893.

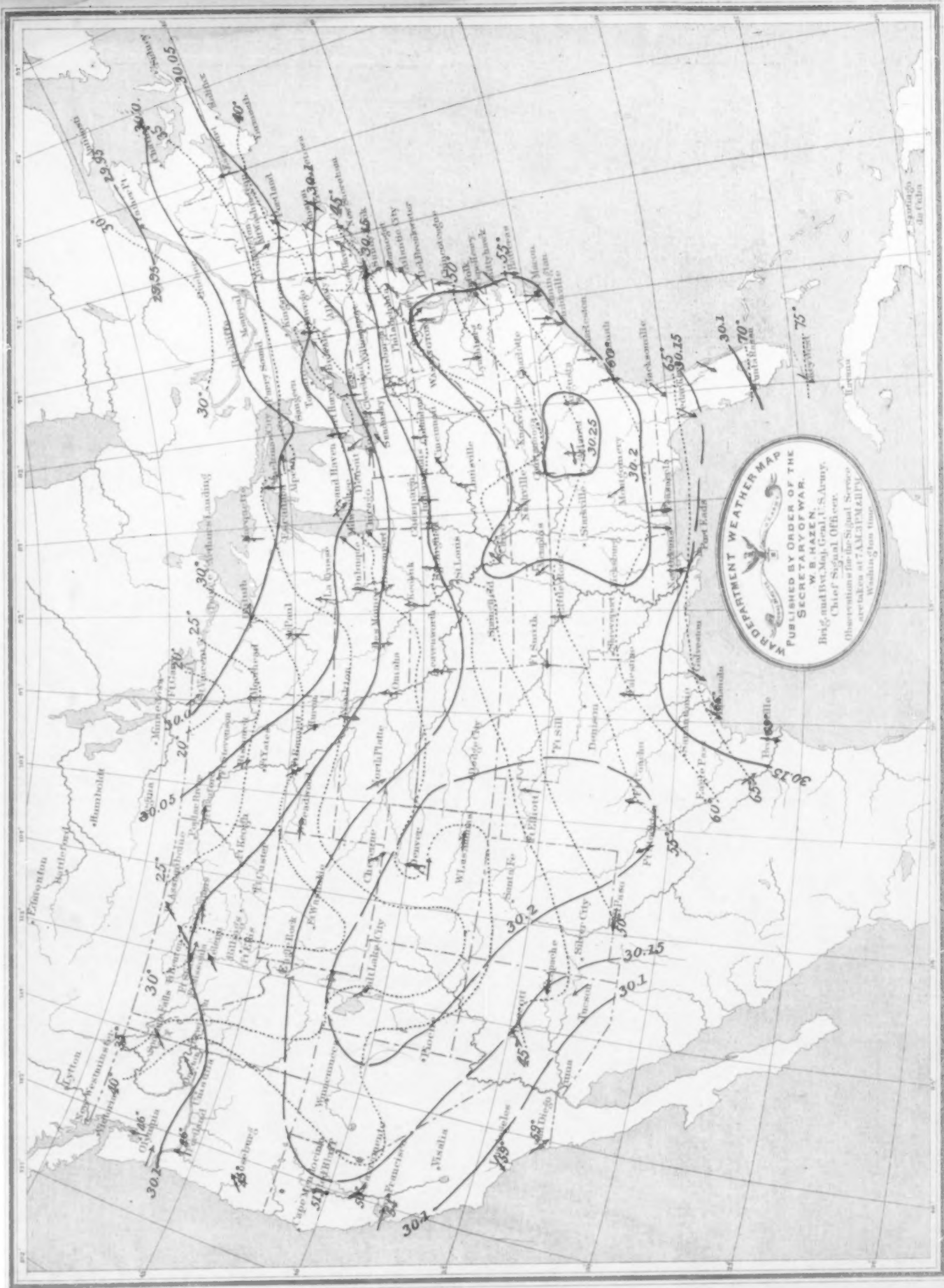


Chart IV. Precipitation, November, 1883.

